

Answer the following questions :

1 Choose the correct answer from those given :

- 1 One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ in $\mathbb{R} \times \mathbb{R}$ is
 (a) $(-4, 2)$ (b) $(2, -4)$ (c) $(3, 1)$ (d) $(4, 2)$
- 2 If $A \cap B = \emptyset$, then $P(A - B) = \dots\dots\dots$
 (a) $P(A)$ (b) $P(B)$ (c) $P(B - A)$ (d) 1
- 3 If $x^2 + kx - 21 = (x - 3)(x + 7)$, then $k = \dots\dots\dots$
 (a) -2 (b) 4 (c) 8 (d) 20
- 4 If $\frac{1}{x} + \frac{1}{y} + \frac{1}{xy} = \frac{k}{xy}$, then $k = \dots\dots\dots$
 (a) 2 (b) 3 (c) $x + y + 1$ (d) $x + y$
- 5 If $5^{x-3} = 1$, then $2x^2 = \dots\dots\dots$
 (a) 36 (b) 9 (c) 18 (d) 3
- 6 If the width of the rectangle is 3 cm. , and its diagonal length is 5 cm. , then its length is cm.
 (a) 2 (b) $\frac{5}{3}$ (c) 4 (d) $\frac{3}{5}$

2 [a] By using the general formula , find in \mathbb{R} the solution set of the equation : $x(x - 2) = 1$

[b] If $n(x) = \frac{x^3 + x}{x^2 + 1} + \frac{x^2 + 2x + 4}{x^3 - 8}$, find $n(x)$ in the simplest form , showing the domain.

3 [a] If the set of zeroes of the function $f : f(x) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$ and its domain is $\mathbb{R} - \{2\}$, find the value of each of a and b

[b] If $n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$, find $n(x)$ in the simplest form , showing the domain.

4 [a] If $n_1(x) = \frac{x^2 + 5x + 6}{x^2 + x - 2}$ and $n_2(x) = \frac{x^2 - 2x - 15}{x^2 - 6x + 5}$, is $n_1 = n_2$? and why ?

[b] If A and B are two events of the sample space of a random experiment , and

$P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{5}{8}$, find each of the following :

- 1 $P(A \cap B)$
- 2 $P(B - A)$
- 3 $P(A \cup B)$

5 [a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$x - y = 3 \quad , \quad y^2 - xy = 21$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically or graphically : $y = x + 4 \quad , \quad x + y = 4$



Answer the following questions :

1 Choose the correct answer from those given :

- 1 In the experiment of tossing a piece of coin once , if A is the event of appearance of a head , B is the event of appearance of a tail , then $P(A \cup B) = \dots\dots\dots$
 (a) $\frac{1}{2}$ (b) 1 (c) zero (d) \emptyset
- 2 The number of solutions of the equation $x - y = 0$ in $\mathbb{R} \times \mathbb{R}$ is $\dots\dots\dots$
 (a) 1 (b) 2 (c) 3 (d) infinite
- 3 The set of zeroes of $f : f(x) = \frac{-3}{x-2}$ is $\dots\dots\dots$
 (a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{3\}$ (c) $\{2\}$ (d) \emptyset
- 4 If the curve of the quadratic function f passes through the points $(-1, 0)$, $(0, -4)$, $(4, 0)$, then the solution set of the equation $f(x) = 0$ in \mathbb{R} is $\dots\dots\dots$
 (a) $\{-1, 0\}$ (b) $\{-4, 0\}$ (c) $\{-1, 4\}$ (d) $\{4, -4\}$
- 5 If $2^{x+1} = 1$, then $x \in \dots\dots\dots$
 (a) $\{0\}$ (b) $\{0, 1\}$ (c) $\{-1\}$ (d) $\mathbb{R} - \{-1\}$
- 6 If $\sqrt{x^2} = 25$, then $x = \dots\dots\dots$
 (a) 5 (b) ± 5 (c) 25 (d) ± 25

- 2 [a] If A , B are two events in a random experiment and $P(A) = 0.6$, $P(B) = 0.5$, $P(A \cap B) = 0.3$, find : $P(A \cup B)$, $P(\bar{B})$

[b] Simplify to the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

- 3 [a] By using the general formula , find in \mathbb{R} the solution set of the equation :

$$3x^2 - 6x = -1 \text{ (approximating the result to the nearest two decimals)}$$

- [b] If the domain of the function n is $\mathbb{R} - \{3\}$ where $n(x) = \frac{x-1}{x^2 - ax + 9}$, find the value of a

- 4 [a] Find the solution set of the following two equations together in $\mathbb{R} \times \mathbb{R}$:

$$y - x = 2 \text{ , } x^2 + xy - 4 = 0$$

[b] Find $n(x)$ in the simplest form , showing the domain of n :

$$n(x) = \frac{x-3}{x^2 - 7x + 12} - \frac{x-3}{3-x}$$

5 [a] Two acute angles in a right-angled triangle. The difference between their measures is 50°

Find the measure of each angle.

[b] If $n(x) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, find :

1 $n^{-1}(x)$ in the simplest form, showing the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 3$



Answer the following questions :

1 Choose the correct answer from those given :

- 1 If $n(X) = \frac{X^2 - 2X}{(X-2)(X^2+2)}$, then the domain of n^{-1} is
- (a) \mathbb{R} (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0, 2\}$
- 2 If A and B are two mutually exclusive events from the sample space S of a random experiment, then $P(A - B) = \dots\dots\dots$
- (a) $P(B)$ (b) $P(A)$ (c) $P(\bar{A})$ (d) $P(\bar{B})$
- 3 In the equation : $aX^2 + bX + c = 0$, if : $b^2 - 4ac > 0$, then the equation has roots in \mathbb{R}
- (a) 1 (b) 2 (c) zero (d) ∞
- 4 The rule which describes the pattern $(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots)$ where $n \in \mathbb{Z}_+$ is
- (a) $\frac{2}{n+1}$ (b) $n + \frac{1}{2}$ (c) $\frac{n}{n+1}$ (d) $\frac{2n-1}{n+1}$
- 5 If $2^7 \times 3^7 = 6^k$, then $k = \dots\dots\dots$
- (a) 14 (b) 7 (c) 6 (d) 5
- 6 If $3^X = 4$, $4^Y = 12$, then $\frac{Xy}{X+1} = \dots\dots\dots$
- (a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

2 [a] If A, B are two events from the sample space of a random experiment and

$$P(A) = 0.7, P(B) = 0.5 \text{ and } P(A \cap B) = 0.3$$

, find : $P(\bar{A})$, $P(A - B)$ and $P(A \cup B)$

- [b] If the set of zeroes of the function f where $f(X) = X^2 - 10X + a$ is $\{5\}$, then find the value of a

3 [a] Find the S.S. in \mathbb{R}^2 of the two equations : $X + y = 2$, $\frac{1}{X} + \frac{1}{y} = 2$

[b] If $n_1(X) = \frac{X^2}{X^3 - X^2}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$,

prove that : $n_1 = n_2$

4 [a] Find $n(X)$ in the simplest form and state the domain if :

$$n(X) = \frac{X^2 - 3X}{2X^2 - X - 6} \div \frac{2X^2 - 3X}{4X^2 - 9}$$

[b] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x + 2y = 8 \quad , \quad 3x + y = 9$$

5 [a] Using the general rule , find the solution set of the following equation in \mathbb{R} :

$$2x^2 - 5x + 1 = 0$$

[b] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} - \frac{2x - 6}{x^2 - 5x + 6}$$



Answers of model 1

1

- 1 d 2 a 3 b
4 c 5 c 6 c

2

[a] $\because x(x-2) = 1 \quad \therefore x^2 - 2x - 1 = 0$

$\therefore a = 1, b = -2, c = -1$

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1}$$

$$= \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$$

$\therefore x = 1 + \sqrt{2} \text{ or } x = 1 - \sqrt{2}$

$\therefore \text{The S.S.} = \{1 + \sqrt{2}, 1 - \sqrt{2}\}$

[b] $\because n(x) = \frac{x(x^2+1)}{x^2+1} + \frac{x^2+2x+4}{(x-2)(x^2+2x+4)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{2\}$

$$n(x) = x + \frac{1}{x-2} = \frac{x(x-2)+1}{x-2}$$

$$= \frac{x^2-2x+1}{x-2} = \frac{(x-1)^2}{x-2}$$

3

[a] $\because z(f) = \{3\} \quad \therefore \text{At } x = 3$

$\therefore x^2 - ax + 9 = 0 \quad \therefore 3^2 - a \times 3 + 9 = 0$

$\therefore 9 - 3a + 9 = 0 \quad \therefore -3a = -18 \quad \therefore a = 6$

$\therefore \text{The domain of } f = \mathbb{R} - \{2\}$

$\therefore \text{At } x = 2 \quad \therefore bx + 4 = 0$

$\therefore 2b + 4 = 0 \quad \therefore 2b = -4 \quad \therefore b = -2$

[b] $\because n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x-1)} \div \frac{x(x^2+2x+4)}{(2x+3)(x-1)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{2, 1, 0, -\frac{3}{2}\}$

$$n(x) = \frac{x^2+2x+4}{x-1} \times \frac{(2x+3)(x-1)}{x(x^2+2x+4)} = \frac{2x+3}{x}$$

4

[a] $\because n_1 = \frac{(x+3)(x+2)}{(x+2)(x-1)}$

$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-2, 1\}$

$n_1(x) = \frac{x+3}{x-1}$

$\therefore n_2(x) = \frac{(x-5)(x+3)}{(x-5)(x-1)}$

$\therefore \text{The domain of } n_2 = \mathbb{R} - \{5, 1\}$

$n_2(x) = \frac{x+3}{x-1}$

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

[b] 1 $\because P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$\therefore P(A \cap B) = P(A) + P(B) - P(A \cup B)$

$$= \frac{1}{4} + \frac{1}{2} - \frac{5}{8} = \frac{1}{8}$$

2 $P(B - A) = P(B) - P(A \cap B) = \frac{1}{2} - \frac{1}{8} = \frac{3}{8}$

3 $P(A \cup B) = 1 - P(A \cap B) = 1 - \frac{1}{8} = \frac{7}{8}$

5

[a] $\because x - y = 3 \quad \therefore x = y + 3$ (1)

$y^2 - xy = 21$ (2)

substituting from (1) in (2) :

$\therefore y^2 - (y+3)y = 21 \quad \therefore y^2 - y^2 - 3y = 21$

$\therefore -3y = 21 \quad \therefore y = -7$

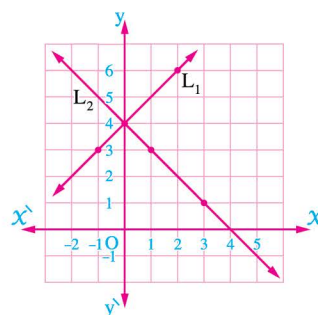
substituting in (1) : $\therefore x = -4$

$\therefore \text{The S.S.} = \{(-4, -7)\}$

[b] $y = x + 4 \quad , \quad x = 4 - y$

x	-1	0	2
y	3	4	6

x	3	1	0
y	1	3	4



From the graph : $\therefore \text{The S.S.} = \{(0, 4)\}$

Answers of model 2

1

- 1 b 2 d 3 d
4 c 5 c 6 d

2

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.6 + 0.5 - 0.3 = 0.8$
 $\therefore P(\bar{B}) = 1 - P(B) \quad \therefore P(\bar{B}) = 1 - 0.5 = 0.5$
 [b] $\therefore n(X) = \frac{(X-1)(X^2+X+1)}{(X-1)^2} \times \frac{2(X-1)}{X^2+X+1}$
 \therefore The domain of $n = \mathbb{R} - \{1\}$, $n(X) = 2$

3

[a] $\therefore 3X^2 - 6X + 1 = 0$
 $\therefore a = 3, b = -6, c = 1$
 $\therefore X = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{6 \pm \sqrt{24}}{6}$
 $= \frac{6 \pm 2\sqrt{6}}{6} = \frac{3 \pm \sqrt{6}}{3}$
 $\therefore X \approx 1.82$ or $X \approx 0.18$
 The S.S. = $\{1.82, 0.18\}$
 [b] \therefore The domain of $n = \mathbb{R} - \{3\}$
 \therefore At $X = 3$ $\therefore X^2 - aX + 9 = 0$
 $\therefore 9 - 3a + 9 = 0 \quad \therefore -3a = -18 \quad \therefore a = 6$

4

[a] $\therefore y - X = 2 \quad \therefore y = X + 2$ (1)
 $\therefore X^2 + Xy - 4 = 0$ (2)
 Substituting from (1) in (2):
 $\therefore X^2 + X(X+2) - 4 = 0$
 $\therefore X^2 + X^2 + 2X - 4 = 0$
 $\therefore 2X^2 + 2X - 4 = 0$ (Dividing by 2)
 $\therefore X^2 + X - 2 = 0$
 $(X-1)(X+2) = 0$
 $\therefore X = 1$ or $X = -2$
 Substituting in (1): $\therefore y = 3$ or $y = 0$
 \therefore The S.S. = $\{(1, 3), (-2, 0)\}$
 [b] $\therefore n(X) = \frac{X-3}{(X-4)(X-3)} + \frac{X-3}{X-3}$
 \therefore The domain of $n = \mathbb{R} - \{4, 3\}$
 $\therefore n(X) = \frac{1}{X-4} + 1 = \frac{1+X-4}{X-4} = \frac{X-3}{X-4}$

5

[a] Let the measure of the first angle be X°
 \therefore the measure of the second angle be y°
 $\therefore X + y = 90^\circ$ (1)
 $\therefore X - y = 50^\circ$ (2)
 Adding (1) and (2): $\therefore 2X = 140^\circ \quad \therefore X = 70^\circ$
 Substituting in (1): $\therefore y = 20^\circ$
 \therefore The measures of the two angles are $70^\circ, 20^\circ$
 [b] [1] $\therefore n(X) = \frac{X(X-2)}{(X-2)(X^2+2)}$
 $\therefore n^{-1}(X) = \frac{(X-2)(X^2+2)}{X(X-2)}$
 \therefore The domain of $n^{-1} = \mathbb{R} - \{0, 2\}$
 $\therefore n^{-1}(X) = \frac{X^2+2}{X}$
 [2] $\therefore n^{-1}(X) = 3 \quad \therefore \frac{X^2+2}{X} = 3$
 $\therefore X^2 - 3X + 2 = 0 \quad \therefore (X-2)(X-1) = 0$
 $\therefore X = 2$ (refused) or $X = 1$

Answers of model 3

1

[1] d [2] b [3] b
 [4] c [5] b [6] b

2

[a] $P(\bar{A}) = 1 - P(A) = 1 - 0.7 = 0.3$
 $P(A - B) = P(A) - P(A \cap B)$
 $= 0.7 - 0.3 = 0.4$
 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.7 + 0.5 - 0.3 = 0.9$
 [b] $\therefore z(f) = \{5\} \quad \therefore$ At $X = 5$
 $\therefore X^2 - 10X + a = 0 \quad \therefore (5)^2 - 10 \times 5 + a = 0$
 $\therefore 25 - 50 + a = 0 \quad \therefore a = 25$

3

[a] $\therefore X + y = 2$ (1)
 $\therefore \frac{1}{X} + \frac{1}{y} = 2 \quad \therefore X + y = 2Xy$ (2)

Substituting in (1) from (2) : $\therefore 2 = 2xy$

$$\therefore xy = 1 \quad \therefore x = \frac{1}{y}$$

Substituting in (1) : $\therefore \frac{1}{y} + y = 2$

Multiplying by y : $\therefore 1 + y^2 = 2y$

$$\therefore y^2 - 2y + 1 = 0 \quad \therefore (y - 1)^2 = 0$$

$$\therefore y = 1$$

Substituting in (1) : $\therefore x = 1$

$$\therefore \text{The S.S.} = \{(1, 1)\}$$

$$[b] \therefore n_1(x) = \frac{x^2}{x^2(x-1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\} \quad \left. \vphantom{\frac{1}{x-1}} \right\} (1)$$

$$\therefore n_1(x) = \frac{1}{x-1}$$

$$\begin{aligned} \therefore n_2(x) &= \frac{x(x^2 + x + 1)}{x(x^3 - 1)} \\ &= \frac{x(x^2 + x + 1)}{x(x-1)(x^2 + x + 1)} \end{aligned}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\} \quad \left. \vphantom{\frac{1}{x-1}} \right\} (2)$$

$$\therefore n_2(x) = \frac{1}{x-1}$$

From (1) and (2) : $\therefore n_1 = n_2$

4

$$[a] \therefore n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \div \frac{x(2x-3)}{(2x-3)(2x+3)}$$

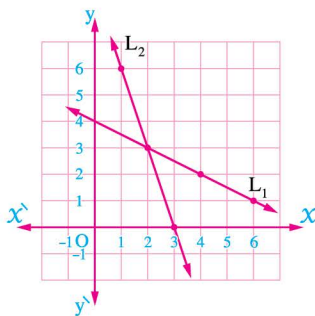
$$\therefore \text{The domain of } n = \mathbb{R} - \left\{-\frac{3}{2}, 2, 0, \frac{3}{2}\right\}$$

$$\begin{aligned} \therefore n(x) &= \frac{x(x-3)}{(2x+3)(x-2)} \times \frac{(2x-3)(2x+3)}{x(2x-3)} \\ &= \frac{x-3}{x-2} \end{aligned}$$

$$[b] x = 8 - 2y \quad , y = 9 - 3x$$

x	6	4	2
y	1	2	3

x	1	2	3
y	6	3	0



From the graph : $\therefore \text{The S.S.} = \{(2, 3)\}$

5

$$[a] \therefore 2x^2 - 5x + 1 = 0$$

$$\therefore a = 2, b = -5, c = 1$$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$$

$$\therefore \text{The S.S.} = \left\{ \frac{5 + \sqrt{17}}{4}, \frac{5 - \sqrt{17}}{4} \right\}$$

$$[b] \therefore n(x) = \frac{x(x+2)}{(x+2)(x-2)} - \frac{2(x-3)}{(x-2)(x-3)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-2, 2, 3\}$$

$$\therefore n(x) = \frac{x}{x-2} - \frac{2}{x-2} = \frac{x-2}{x-2} = 1$$

Model Examinations of the School Book



on Algebra and Probability

Model 1

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

- 1 The domain of the function $n : n(x) = \frac{x}{x-1}$ is
 (a) $\mathbb{R} - \{0\}$ (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{0, 1\}$ (d) $\mathbb{R} - \{-1\}$
- 2 The number of solutions of the two equations : $x + y = 2$ and $y + x = 3$ together in $\mathbb{R} \times \mathbb{R}$ is
 (a) zero (b) 1 (c) 2 (d) 3
- 3 If $x \neq 0$, then $\frac{5x}{x^2+1} \div \frac{x}{x^2+1} = \dots\dots\dots$
 (a) -5 (b) -1 (c) 1 (d) 5
- 4 If the ratio between the perimeters of two squares is $1 : 2$, then the ratio between their areas is
 (a) $1 : 2$ (b) $2 : 1$ (c) $1 : 4$ (d) $4 : 1$
- 5 The equation of the symmetric axis of the curve of the function f where $f(x) = x^2 - 4$ is
 (a) $x = -4$ (b) $x = 0$ (c) $y = 0$ (d) $y = -4$
- 6 If $A \subset S$ of random experiment and $P(\bar{A}) = 2P(A)$, then $P(A) = \dots\dots\dots$
 (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

2 [a] By using the general formula, find in \mathbb{R} the solution set of the equation :

$$2x^2 - 5x + 1 = 0 \text{ "approximate the result to the nearest one decimal".}$$

[b] Find $n(x)$ in the simplest form showing the domain where :

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{4}{x^2-4x}$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - y = 0 \text{ and } x^2 + xy + y^2 = 27$$

[b] Find $n(x)$ in the simplest form showing the domain where :

$$n(x) = \frac{x^2+4x+3}{x^3-27} \div \frac{x+3}{x^2+3x+9} \text{ then find } n(2), n(-3) \text{ if possible.}$$

- 2** If $n^{-1}(x) = 3$, then find the value of x

-
- A Venn diagram with a universal set S represented by a rectangle. Inside S , there are two overlapping ellipses labeled B and A . Ellipse B contains the elements $\times 1$, $\times 2$, $\times 3$, and $\times 4$. Ellipse A contains the elements $\times 2$, $\times 3$, and $\times 5$. The intersection of B and A contains the elements $\times 2$ and $\times 3$. The element $\times 6$ is located outside both ellipses but within the rectangle S .

(d) 1

- 2 [a] Find in \mathbb{R} the solution set of the equation : $3x^2 - 5x + 1 = 0$

by using the formula "approximate the result to the nearest two decimal places".

- [b] Simplify :

$$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}, \text{ showing the domain of } n.$$

- 3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 1$, $x^2 + y^2 = 25$

- [b] If A and B are two events of a random experiment and

$$P(A) = 0.3 \text{ , } P(B) = 0.6 \text{ , } P(A \cap B) = 0.2$$

$$\text{Find : } \textcircled{1} P(A \cup B)$$

$$\textcircled{2} P(A - B)$$

- 4 [a] Solve the following two equations in $\mathbb{R} \times \mathbb{R}$: $2x - y = 3$, $x + 2y = 4$

- [b] Simplify :

$$n(x) = \frac{x^2 + 3x}{x^2 - 9} \div \frac{2x}{x + 3}, \text{ showing the domain of } n.$$

- 5 [a] Simplify :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} + \frac{x + 3}{x^2 - 5x + 6}, \text{ showing the domain of } n.$$

- [b] Graph the function f where $f(x) = x^2 - 1$, $x \in [-3, 3]$, from the graph find in \mathbb{R} the solution set of the equation : $x^2 - 1 = 0$

Governorates' Examinations



on Algebra and Probability

1

Cairo Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

- 1 If the two equations $X + 3y = 6$, $2X + my = 12$ have an infinite number of solutions , then $m =$
- (a) 1 (b) 2 (c) 3 (d) 6
- 2 If $2^{k-3} = 1$, then $k =$
- (a) -3 (b) zero (c) 3 (d) 8
- 3 The set of zeroes of the function $f : f(X) = \text{zero}$ is
- (a) $\mathbb{R} - \{0\}$ (b) \emptyset (c) $\{0\}$ (d) \mathbb{R}
- 4 If $X^2 + aX - 4 = (X + 2)(X - 2)$, then $a =$
- (a) -2 (b) zero (c) 2 (d) 4
- 5 If the two events A , B are mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) =$
- (a) 1 (b) $\frac{1}{2}$ (c) \emptyset (d) zero
- 6 If $|X| = 7$, then $X =$
- (a) 7 (b) -7 (c) ± 7 (d) 14

- 2 [a] Two real numbers their sum is 40 , and the difference between them is 10 , find the two numbers.

[b] Find $n(X)$ in the simplest form , showing the domain where : $n(X) = \frac{X}{X-2} - \frac{2X+4}{X^2-4}$

- 3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :

$$X - 3 = 0 \quad , \quad X^2 + y^2 = 25$$

[b] If $n_1(X) = \frac{X^2}{X^3 - X^2}$, $n_2(X) = \frac{X^2 + X + 1}{X^3 - 1}$

, prove that : $n_1(X) = n_2(X)$ for all the values of X which belong to the common domain and find this domain.

- 4 [a] Find $n(X)$ in the simplest form , showing the domain where :

$$n(X) = \frac{X^3 - 8}{X^2 + X - 6} \times \frac{X + 3}{X^2 + 2X + 4}$$

- [b] Find algebraically in \mathbb{R} the solution set of the equation : $2x^2 + 5x - 6 = 0$, approximating the results to the nearest one decimal place.

- 5 [a] If A , B are two events of the sample space of a random experiment and $P(A) = 0.7$, $P(B) = 0.5$, $P(A \cap B) = 0.3$

, find : 1 $P(A \cup B)$

2 $P(A - B)$

[b] If $n(x) = \frac{x}{x+3}$

1 Find $n^{-1}(x)$, showing the domain of n^{-1}

2 If $n^{-1}(x) = 4$, find the value of x

2

Giza Governorate



Answer the following questions :

- 1 Choose the correct answer from the given ones :

- 1 If the perimeter of a square is 16 cm. , then its area = cm^2 .

(a) 4

(b) 8

(c) 16

(d) 64

- 2 The domain of the function $n : n(x) = \frac{x}{x^2 - 1}$ is

(a) $\{-1\}$

(b) $\mathbb{R} - \{1\}$

(c) $\{1, -1\}$

(d) $\mathbb{R} - \{1, -1\}$

- 3 If $\frac{1}{3}x = 2$, then $\frac{1}{2}x = \dots\dots\dots$

(a) 2

(b) 3

(c) 6

(d) 8

- 4 The number of solutions of the two equations $x + y = 1$, $x + y = 2$ together in $\mathbb{R} \times \mathbb{R}$ is

(a) zero

(b) 1

(c) 2

(d) 3

- 5 If $x^2 + kx + 81$ is a perfect square , then $k = \dots\dots\dots$

(a) ± 6

(b) ± 9

(c) ± 18

(d) ± 81

- 6 If $A \subset S$ of a random experiment , $P(A) + P(\bar{A}) = 2k$, then $k = \dots\dots\dots$

(a) 1

(b) $\frac{1}{2}$

(c) $\frac{1}{3}$

(d) $\frac{1}{4}$

- 2 [a] By using the formula find in \mathbb{R} the solution set of the equation :

$$2x^2 - 5x + 1 = 0 \text{ rounding the results to two decimal places.}$$

- [b] Find $n(x)$ in its simplest form where :

$$n(x) = \frac{x^2 - 4}{x^3 - 8} \div \frac{x^2 - x - 6}{x^2 + 2x + 4} , \text{ showing the domain.}$$

Algebra and Probability

- 3 [a] A right-angled triangle of hypotenuse length 10 cm. and its perimeter is 24 cm.
Find the lengths of the other two sides.

- [b] If A , B are two mutually exclusive events of a random experiment
 , $P(A) = 0.2$, $P(B) = 0.5$, find : $P(A \cup B)$ and $P(A - B)$

- 4 [a] If $n(X) = \frac{X^2 - 3X}{X^2 - 5X + 6}$
 , find : 1 $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1}
 2 The value of X if $n^{-1}(X) = 2$

- [b] Find the solution set for the following equations algebraically in $\mathbb{R} \times \mathbb{R}$:

$$X + 2y = 4 \quad , \quad 3X - y = 5$$

- 5 [a] If $n(X) = \frac{X^2}{X-1} + \frac{X}{1-X}$, then find $n(X)$ in the simplest form , showing the domain.
 [b] If $n_1(X) = \frac{X^2 + X - 6}{X^2 - 4}$, $n_2(X) = \frac{X^2 - 9}{X^2 - X - 6}$, then show whether $n_1 = n_2$ or not and why.

3

Alexandria Governorate



Answer the following questions : (Calculators are allowed)

- 1 Choose the correct answer from those given :
- 1 The set of zeroes of the function f where $f(X) = X + 4$ in \mathbb{R} is
 (a) $\{4, -4\}$ (b) $\{-4\}$ (c) \mathbb{R} (d) \emptyset
- 2 If $X^3 y^{-3} = 8$, then $\frac{y}{X} = \dots\dots\dots$
 (a) $\frac{1}{512}$ (b) $\frac{1}{8}$ (c) 2 (d) $\frac{1}{2}$
- 3 The equation of the symmetric axis of the curve of the function f
 where $f(X) = X^2 - 4$ is
 (a) $X = -4$ (b) $X = \text{zero}$ (c) $y = \text{zero}$ (d) $y = -4$
- 4 The solution set of the equation : $X^2 = 9$ in \mathbb{Q} is
 (a) $\{-3\}$ (b) $\{3\}$ (c) \emptyset (d) $\{-3, 3\}$
- 5 If $A \subset S$ of a random experiment and $P(\hat{A}) = 2 P(A)$, then $P(A) = \dots\dots\dots$
 (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1
- 6 $\frac{5^{X+2}}{5^{X+1}} = \dots\dots\dots$
 (a) 5 (b) 10 (c) 15 (d) 20

- 2 [a] Find the solution set of the two equations :

$$x - y = 0 \text{ and } x^2 + xy + y^2 = 27 \text{ in } \mathbb{R} \times \mathbb{R}$$

- [b] Find the common domain for which $n_1(x)$ and $n_2(x)$ are equal , where :

$$n_1(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4} , \quad n_2(x) = \frac{x^2 - 2x - 3}{x^2 + 2x + 1}$$

- 3 [a] By using the general formula , find in \mathbb{R} the solution set of the equation :

$$2x^2 + 5x = 0$$

- [b] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^3 - 1}{x^2 - x} \times \frac{x + 3}{x^2 + x + 1}$$

- 4 [a] Find algebraically the solution set of the two equations :

$$2x + y = 1 , \quad x + 2y = 5 \text{ in } \mathbb{R} \times \mathbb{R}$$

- [b] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x + 5}{x^2 + 6x + 5}$$

- 5 [a] If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$

- 1 Find $n^{-1}(x)$ in the simplest form , showing the domain on n^{-1}

- 2 If $n^{-1}(x) = 3$, then find the value of x

- [b] If A and B are two mutually exclusive events of a random experiment and

$$P(A) = \frac{1}{3} , \quad P(A \cup B) = \frac{7}{12} , \text{ find : } P(B)$$

4 El-Kalyoubia Governorate



Answer the following questions :

- 1 Choose the correct answer :

- 1 If $x^2 + kx - 21 = (x - 3)(x + 7)$, then $k = \dots\dots\dots$

(a) - 2

(b) 4

(c) 8

(d) 20

- 2 One of the solutions for the two equations : $x - y = 2$, $x^2 + y^2 = 20$ in $\mathbb{R} \times \mathbb{R}$ is

(a) (- 4 , 2)

(b) (2 , - 4)

(c) (3 , 1)

(d) (4 , 2)

- 3 If $5^{x-3} = 1$, then $2x^2 = \dots\dots\dots$

(a) 36

(b) 9

(c) 18

(d) 3

Algebra and Probability

4 If $A \cap B = \emptyset$, then $P(A - B) = \dots\dots\dots$

- (a) $P(A)$ (b) $P(B)$ (c) $P(B - A)$ (d) 1

5 If the width of the rectangle is 3 cm., and its diagonal length is 5 cm., then its length is cm.

- (a) 2 (b) $\frac{5}{3}$ (c) 4 (d) $\frac{3}{5}$

6 If $\frac{1}{x} + \frac{1}{y} + \frac{1}{xy} = \frac{k}{xy}$, then $k = \dots\dots\dots$

- (a) 2 (b) 3 (c) $x + y + 1$ (d) $x + y$

2 [a] If A and B are two events from the sample space of a random experiment and $P(A) = 0.8$, $P(B) = 0.7$, $P(A \cap B) = 0.6$

, find : 1 $P(A \cup B)$ 2 The probability of non-occurrence of the event A

[b] A rectangle with a length more than its width by 4 cm. If the perimeter of the rectangle is 28 cm., find the area of the rectangle.

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 0$, $x^2 + xy + y^2 = 27$

[b] Find $n(x)$ in the simplest form, showing the domain : $n(x) = \frac{x^2 + 2x}{x^3 - 27} \div \frac{x + 2}{x^2 + 3x + 9}$

4 [a] Find in \mathbb{R} the solution set of the equation : $2x^2 - 4x + 1 = 0$

approximating the results to one decimal place. (using the general rule)

[b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, prove that : $n_1 = n_2$

5 [a] Find $n(x)$ in the simplest form, showing the domain :

$$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} + \frac{x^2 - 9}{x^2 + x - 6}$$

[b] If the domain of the function f where $f(x) = \frac{x}{x^2 - 5x + m}$ is $\mathbb{R} - \{2, k\}$, then find the value of each of m and k

5 El-Sharkia Governorate



Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from the given ones :

1 If the domain of the fractional function $n(x)$ is $\mathbb{R} - \{2, 3, 4\}$, then $n(3) = \dots\dots\dots$

- (a) 3 (b) 2 (c) 4 (d) not exist

2 If $x^2 + y^2 = 5$, $xy = 2$ where $x \in \mathbb{R}$, $y \in \mathbb{R}$, then $(x + y)^2 = \dots\dots\dots$

- (a) 7 (b) 9 (c) 5 (d) 13

3 The point $(2, -1)$ does not belong to the straight line whose equation is

- (a) $x + y = 1$ (b) $x - y = 3$ (c) $x = 2$ (d) $y = 5$

4 If $n(x) = \frac{x}{x-1}$, then the domain of n^{-1} is

- (a) $\mathbb{R} - \{1, 0\}$ (b) $\mathbb{R} - \{0\}$ (c) $\mathbb{R} - \{1\}$ (d) $\{1, 0\}$

5 The two straight lines $L_1 : 3x + 7y = 0$ and $L_2 : 5x + 9y = 0$ are intersecting in the

- (a) third quadrant. (b) fourth quadrant. (c) first quadrant. (d) origin point.

6 If A, B are two events from the sample space of a random experiment and $A \subset B$, which of the following expressions is false ?

- (a) $P(A \cup B) = P(B)$ (b) $P(A \cap B) = P(A)$
(c) $P(A - B) = \text{zero}$ (d) $P(A - B) = P(B)$

2 [a] By using the general formula, find in \mathbb{R} the solution set of the equation : $x(x-2) = 1$

[b] If $n(x) = \frac{x^3 + x}{x^2 + 1} + \frac{x^2 + 2x + 4}{x^3 - 8}$, find $n(x)$ in the simplest form, showing the domain.

3 [a] Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations : $2x - y = 3$, $x + 2y = 4$

[b] If $n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} \div \frac{10 - 2x}{x^2 - 6x + 9}$, find $n(x)$ in the simplest form, showing the domain.

4 [a] Find the solution set of the following two equations in $\mathbb{R} \times \mathbb{R}$:

$$x + 2y = 2, \quad x^2 + 2xy = 2$$

[b] If $n_1(x) = 1 - \frac{1}{x}$, $n_2(x) = \frac{1-x}{x}$, show whether $n_1 = n_2$ or not.

5 [a] In a random experiment, a regular dice is rolled once and observing the upper face.

If : A : The event of getting an even number.

B : The event of getting a prime number.

, find : $P(A)$, $P(B)$, $P(A \cup B)$

[b] If $n(x) = \frac{k}{x} + \frac{9}{x+m}$ where the domain of n is $\mathbb{R} - \{0, 4\}$, and $n(5) = 2$

, find the value of each of : m, k

6

El-Monofia Governorate



Answer the following questions : (Using calculator is permitted)

1 Choose the correct answer from those given :

1 $4^{15} + 4^{15} = \dots\dots\dots$

(a) 4^{30}

(b) 4^{zero}

(c) 8^{15}

(d) 2^{31}

2 The necessary numbers to complete the pattern :

$\frac{1}{5}, 0.4, \frac{3}{5}, \dots, \dots, \dots, \frac{7}{5}$ is $\dots\dots\dots$

(a) $0.8, \frac{6}{5}, 1.2$

(b) $0.8, 1, 1.2$

(c) $0.6, 0.8, 1$

(d) $0.8, 1, 4.1$

3 The multiplicative inverse of the number $1 - \sqrt{2}$ is $\dots\dots\dots$

(a) $1 + \sqrt{2}$

(b) $\sqrt{2} - 1$

(c) $-(1 + \sqrt{2})$

(d) $\frac{1 + \sqrt{2}}{2}$

4 The domain of the function $n^{-1}(x) = \frac{x+4}{x-4}$ is $\dots\dots\dots$

(a) \mathbb{R}

(b) $\mathbb{R} - \{4\}$

(c) $\mathbb{R} - \{-4\}$

(d) $\mathbb{R} - \{4, -4\}$

5 The two straight lines : $3x - 5y = 0$, $5x + 3y = 0$ intersect at the $\dots\dots\dots$

(a) 1st quadrant.

(b) 3rd quadrant.

(c) origin point.

(d) 4th quadrant.

6 If $P(A) = 3P(\bar{A})$, then $P(A) = \dots\dots\dots$

(a) $\frac{3}{4}$

(b) 1

(c) $\frac{1}{3}$

(d) $\frac{1}{4}$

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$2x - y = 3$, $x + 2y = 4$

[b] Find in \mathbb{R} by using the general formula the solution set of the equation :

$3x^2 = 5x - 1$ rounding the result to the nearest two decimal digits.

3 [a] If the set of zeroes of the function $f : f(x) = \frac{x^2 - ax + 9}{bx + 4}$ is $\{3\}$ and its domain is $\mathbb{R} - \{2\}$, find the value of each of a and b

[b] If $n(x) = \frac{x^3 - 8}{x^2 - 3x + 2} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$, find $n(x)$ in the simplest form , showing the domain.

4 [a] If $n(x) = \frac{x-3}{x^2-7x+12} - \frac{4}{x^2-4x}$, find $n(x)$ in the simplest form , showing the domain , then find $n(4)$ if it is possible.

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x + y = 4$, $\frac{1}{x} + \frac{1}{y} = 1$, where $x \neq 0, y \neq 0$

5 [a] If $n_1(x) = \frac{x^2 + 5x + 6}{x^2 + x - 2}$ and $n_2(x) = \frac{x^2 - 2x - 15}{x^2 - 6x + 5}$, is $n_1 = n_2$? and why?

[b] If A and B are two events of the sample space of a random experiment, and $P(A) = \frac{1}{4}$, $P(B) = \frac{1}{2}$ and $P(A \cup B) = \frac{5}{8}$, find each of the following:

1 $P(A \cap B)$

2 $P(B - A)$

3 $P(A \cup B)$

7

El-Gharbia Governorate



Answer the following questions:

1 Choose the correct answer:

1 If $2^{x+1} = 1$, then $x \in \dots\dots\dots$

(a) $\{0\}$

(b) $\{0, -1\}$

(c) $\{-1\}$

(d) $\mathbb{R} - \{-1\}$

2 The number of solutions of the equation $x - y = 0$ in $\mathbb{R} \times \mathbb{R}$ is

(a) 1

(b) 2

(c) 3

(d) infinite

3 In the experiment of tossing a piece of coin once, if A is the event of appearance of a head, B is the event of appearance of a tail, then $P(A \cup B) = \dots\dots\dots$

(a) $\frac{1}{2}$

(b) 1

(c) zero

(d) \emptyset

4 The set of zeroes of $f: f(x) = \frac{-3}{x-2}$ is

(a) $\mathbb{R} - \{2\}$

(b) $\mathbb{R} - \{3\}$

(c) $\{2\}$

(d) \emptyset

5 If the curve of the quadratic function f passes through the points $(-1, 0)$, $(0, -4)$, $(4, 0)$, then the solution set of the equation $f(x) = 0$ in \mathbb{R} is

(a) $\{-1, 0\}$

(b) $\{-4, 0\}$

(c) $\{-1, 4\}$

(d) $\{4, -4\}$

6 If $\sqrt{x^2} = 25$, then $x = \dots\dots\dots$

(a) 5

(b) ± 5

(c) 25

(d) ± 25

2 [a] If A and B are two events in the sample space of a random experiment and $P(A) = 0.5$, $P(A \cup B) = 0.8$, $P(B) = x$, $P(A \cap B) = 0.1$

Find the value of: x and $P(A - B)$

[b] If $n(x) = x + \frac{x}{x-2}$, find $n^{-1}(x)$ in the simplest form, showing the domain of n^{-1}

3 [a] Find $n(x)$ in the simplest form, showing the domain of n where:

$$n(x) = \frac{x}{x-2} - \frac{x}{x+2}$$

[b] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations:

$$x - y = 3, \quad y^2 - xy = 21$$

- 4 [a] By using the general rule and without using the calculator , find in \mathbb{R} the solution set of the equation : $x^2 + 2x - 4 = 0$ in the simplest form.

[b] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^2 - x - 6}{x^2 - 9}$, is $n_1 = n_2$? With the reason.

- 5 [a] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^3 - 1}{x^2 - x} \div \frac{x^2 + x + 1}{x + 3}$$

- [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically or graphically : $y = x + 4$, $x + y = 4$

8 El-Dakahlia Governorate



Answer the following questions : (Calculator is permitted)

- 1 [a] Choose the correct answer from the given ones :

1 The solution set of the two equations $x - 3 = 0$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) $\{3, 4\}$ (b) $\{(3, 4)\}$ (c) $\{(4, 3)\}$ (d) \emptyset

2 If A, B are two events in a random experiment , $A \subset B$, then $P(A \cup B) = \dots\dots\dots$

- (a) $P(B)$ (b) $P(A)$ (c) $P(A \cap B)$ (d) 0

3 If $3^y \times 5^y = 225$, then $y = \dots\dots\dots$

- (a) 2 (b) 15 (c) 0 (d) 20

- [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the equations : $3x - y = 5$ and $x + 2y = 4$

- 2 [a] Choose the correct answer from the given ones :

1 The domain of the additive inverse of the function $n : n(x) = \frac{x+2}{x-3}$ is

- (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{-2, 3\}$ (d) \mathbb{R}

2 The set of zeroes of the function $f : f(x) = x^2 + 9$ in \mathbb{R} is

- (a) \mathbb{R} (b) $\{3\}$ (c) $\{3, -3\}$ (d) \emptyset

3 The curve $y = ax^2 + bx + c$ cuts y -axis at the point

- (a) $(0, b)$ (b) $(b, 0)$ (c) $(c, 0)$ (d) $(0, c)$

- [b] Find $n(x)$ in the simplest form , showing the domain : $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{5 - x}{x^2 - 6x + 5}$

- 3 [a] If A, B are two events in a random experiment and $P(A) = 0.6$, $P(B) = 0.5$,

$P(A \cap B) = 0.3$, find : $P(A \cup B)$, $P(\bar{B})$

[b] Simplify to the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

4 [a] If $n_1(x) = \frac{x^2 - x}{x^3 - 2x^2}$, $n_2(x) = \frac{x^2 - 3x + 2}{x^3 - 4x^2 + 4x}$, prove that : $n_1 = n_2$

[b] By using the general rule , find the solution set of the equation :

$$2x^2 - 4x + 1 = 0 \text{ in } \mathbb{R} , \text{ rounding the results to two decimal places.}$$

5 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 0$ and $x = \frac{4}{y}$ algebraically.

[b] If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$

1 Find : $n^{-1}(x)$ and identify the domain of n^{-1}

2 If $n^{-1}(x) = 3$, what is the value of x ?

9

Ismailia Governorate



Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from those given :

1 If x is the additive identity element , y is the multiplicative identity element , then $2^x + 3^y = \dots\dots\dots$

(a) 2 (b) 3 (c) 4 (d) 5

2 The set of zeroes of the function $f : f(x) = 2x - 6$ is $\dots\dots\dots$

(a) $\{1\}$ (b) $\{3\}$ (c) $\{5\}$ (d) $\{7\}$

3 If $\sqrt{x} = 2$, then $\frac{1}{2}x = \dots\dots\dots$

(a) 8 (b) 6 (c) 4 (d) 2

4 The number of solutions of the two equations : $2x - y = 3$, $x + 2y = 4$ in $\mathbb{R} \times \mathbb{R}$ is $\dots\dots\dots$

(a) 1 (b) zero (c) 2 (d) infinite.

5 If A , B are two mutually exclusive events of a random experiment , then $P(A \cap B) = \dots\dots\dots$

(a) \emptyset (b) 1 (c) zero (d) 0.5

6 If $x - y = 3$ and $x + y = 5$, then $x^2 - y^2 + 2 = \dots\dots\dots$

(a) 15 (b) 16 (c) 17 (d) 18

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations together :

$$2x + y = 1 \text{ , } x + 2y = 5$$

[b] If $n_1(x) = \frac{x^2 - 3x + 9}{x^3 + 27}$, $n_2(x) = \frac{2}{2x + 6}$, prove that : $n_1 = n_2$

Algebra and Probability

- 3 [a]** By using the general formula , find in \mathbb{R} the solution set of the equation :
 $3x^2 - 6x = -1$ (approximating the result to the nearest two decimals)
- [b]** If the domain of the function n is $\mathbb{R} - \{3\}$ where $n(x) = \frac{x-1}{x^2 - ax + 9}$, find the value of a
- 4 [a]** Two numbers , their product is 10 and the difference between them is 3
 Find the two numbers.
- [b]** Find $n(x)$ in the simplest form , showing the domain of n where :
 $n(x) = \frac{x^2 + 4x - 5}{x^3 - 8} \div \frac{x+5}{x^2 + 2x + 4}$, then find : $n(3)$, $n(2)$ if it is possible.
- 5 [a]** Find $n(x)$ in the simplest form , showing the domain of n where :
 $n(x) = \frac{x^2 - 3x}{x^2 - 9} + \frac{x-1}{x^2 + 2x - 3}$
- [b]** If A and B are two events in the sample space of a random experiment and
 $P(A) = 0.4$, $P(B) = 0.5$ and $P(A \cap B) = 0.2$
 , find : **1** $P(A \cup B)$ **2** $P(A - B)$

10

Suez Governorate



Answer the following questions : (Calculators are allowed)

- 1** Choose the correct answer from the given ones :
- 1** The set of zeroes of f where $f(x) = x - 5$ is
 (a) \mathbb{R} (b) $\{-5\}$ (c) $\{5\}$ (d) \emptyset
- 2** If $A \subset S$ of a random experiment , $P(\bar{A}) = P(A)$, then $P(A) =$
 (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1
- 3** The solution set in $\mathbb{R} \times \mathbb{R}$ of the two equations : $x = 3$, $y = 4$ is
 (a) $\{(3, 4)\}$ (b) $\{(4, 3)\}$ (c) \mathbb{R} (d) \emptyset
- 4** If the ratio between the perimeters of two squares is 1 : 2 , then the ratio between their areas is
 (a) 1 : 2 (b) 2 : 1 (c) 1 : 4 (d) 4 : 1
- 5** If $n(x) = \frac{x-1}{x+1}$, then the domain of $n^{-1} =$
 (a) $\{-1\}$ (b) $\mathbb{R} - \{-1, 1\}$ (c) $\mathbb{R} - \{-1\}$ (d) \mathbb{R}
- 6** If $a - b = -3$, then $(a - b)^2 =$
 (a) -9 (b) 12 (c) 9 (d) 18

- 2 [a] Find the solution set in $\mathbb{R} \times \mathbb{R}$ of the equations : $x - y = 3$, $2x + y = 9$
(Explain your answer , showing the steps of the solution)

- [b] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 - 2x}{x^2 - 4} + \frac{2x + 6}{x^2 + 5x + 6}$$

- 3 [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations : $x - y = 0$, $xy = 9$

- [b] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 + 2x - 3}{x + 3} \times \frac{x + 1}{x^2 - 1}$$

- 4 [a] A and B are two events from the sample space of a random experiment and
 $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$

Find : 1 $P(A \cup B)$

2 $P(\bar{A})$

- [b] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^2 - 2x + 1}{x^3 - 1} \div \frac{x - 1}{x^2 + x + 1}$$

- 5 [a] Find the solution set for the following equation by using the formula in \mathbb{R} :

$$x^2 - 2x - 6 = 0 \text{ (Rounding the results to two decimal places)}$$

- [b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, prove that : $n_1 = n_2$

11

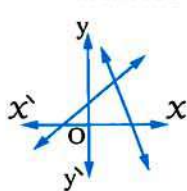
Port Said Governorate



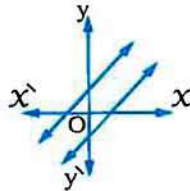
Answer the following questions :

- 1 Choose the correct answer from those given :

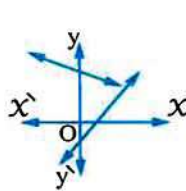
- 1 Which of the following graphs represents two equations of the first degree in two variables which have no common solution ?



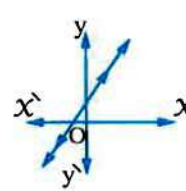
(a)



(b)



(c)



(d)

- 2 The set of zeroes of the function $f : f(x) = x^2 + x + 1$ is

(a) $\{1\}$

(b) $\{-1\}$

(c) \emptyset

(d) $\{-1, 1\}$

Algebra and Probability

- 3 If the ratio between the perimeters of two squares is 3 : 4 , then the ratio between their areas is
- (a) 3 : 4 (b) 9 : 16 (c) 16 : 9 (d) 4 : 3
- 4 If $A \subset S$ of a random experiment , $P(\bar{A}) = 2 P(A)$, then $P(A) = \dots\dots\dots$
- (a) 1 (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$
- 5 If $n(X) = \frac{X-2}{X+5}$, then the domain of the function n^{-1} is
- (a) \mathbb{R} (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{2, -5\}$
- 6 If a fair die is rolled once , then the probability of getting an even number and a prime number together equals
- (a) $\frac{1}{6}$ (b) $\frac{1}{2}$ (c) zero (d) 1

- 2 [a] If the domain of the function $n : n(X) = \frac{X-1}{X^2 - aX + 9}$ is $\mathbb{R} - \{3\}$, then find the value of a

[b] A rectangle is of perimeter 22 cm. and area 24 cm^2 . Find its two dimensions.

- 3 [a] Find in \mathbb{R} by using the general formula the solution set of the equation : $X^2 - 2X - 1 = 0$ approximating the results to the nearest one decimal digit.

[b] Find $n(X)$ in the simplest form , showing the domain where :

$$n(X) = \frac{X^2 + X + 1}{X} \div \frac{X^3 - 1}{X^2 - X}$$

- 4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $X + 3Y = 7$, $5X - Y = 3$

[b] Find $n(X)$ in the simplest form , showing the domain where :

$$n(X) = \frac{X^2 + 2X}{X^2 - 4} + \frac{X - 3}{X^2 - 5X + 6}$$

- 5 [a] A set of cards numbered from 1 to 20 and well mixed. If a card is drawn randomly , find the probability that the drawn card is carrying :

1 A number multiple of 4

2 A number multiple of 5

3 A number multiple of 4 or 5

- [b] If $n_1(X) = \frac{X+3}{X^2-9}$, $n_2(X) = \frac{2}{2X-6}$

, prove that : $n_1(X) = n_2(X)$ for the value of X which belong to the common domain and find the domain.

12

Damietta Governorate



Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from the given ones :

1 If there are an infinite number of solutions of the two equations : $x + 4y = 7$,
 $x + (k - 1)y = 7$ in $\mathbb{R} \times \mathbb{R}$, then $k = \dots\dots\dots$

- (a) 5 (b) 7 (c) 12 (d) 13

2 If $B \subset A$, then $P(A \cup B) = \dots\dots\dots$

- (a) 1 (b) $P(A)$ (c) $P(B)$ (d) $2P(B)$

3 If $x = 2$, $y = 3$, then $(y - 2x)^{10} = \dots\dots\dots$

- (a) -1 (b) zero (c) 5 (d) 1

4 If $ab = 3$, $ab^2 = 12$, then $b = \dots\dots\dots$

- (a) 4 (b) 2 (c) -2 (d) ± 2

5 If 3 is one of zeroes of the function f where $f(x) = x^2 - 3x + c$, then $c = \dots\dots\dots$

- (a) 6 (b) 0 (c) -6 (d) 3

6 If a , b , c are three rational numbers where $a < b$ and c is a negative number ,
 then $ac \dots\dots\dots bc$

- (a) $>$ (b) $=$ (c) \leq (d) $<$

2 [a] By using the general formula , find in \mathbb{R} the solution set of the equation : $x + \frac{4}{x} = 6$
 , rounding the results to one decimal digit.

[b] Simplify : $n(x) = \frac{2x}{x-3} \div \frac{x^2+2x}{x^2-9}$, showing the domain.

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :
 $x + 2y = 4$, $2x - y = 3$

[b] Simplify : $n(x) = \frac{x^2 - 2x + 4}{x^3 + 8} + \frac{x^2 - 1}{x^2 + x - 2}$, showing the domain.

4 [a] If $n_1(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, $n_2(x) = \frac{2x}{2x + 4}$,
 then prove that : $n_1 = n_2$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 2$, $x^2 + y^2 = 20$

5 [a] If the domain of the function $n : n(x) = \frac{x+1}{x^2 - ax + 25}$ is $\mathbb{R} - \{5\}$,
 then find the value of a

Algebra and Probability

[b] If A and B are two events from the sample space of a random experiment ,

$$P(A) = 0.8 \quad , \quad P(B) = 0.7 \quad , \quad P(A \cap B) = 0.6$$

, find : 1 $P(A \cup B)$

2 The probability of non-occurrence of the event A

13 Kafr El-Sheikh Governorate



Answer the following questions : (Calculator is allowed)

1 [a] Choose the correct answer :

1 If there is only one solution for the two equations $x + 4y = 5$ and $3x + ky = 15$, then k can't equal

(a) - 4

(b) 4

(c) 12

(d) - 12

2 If $\sqrt{100 - 36} = 10 - a$, then a =

(a) 2

(b) 6

(c) 4

(d) 3

3 In the opposite figure :

If A and B are two events in the sample space S

of a random experiment ,

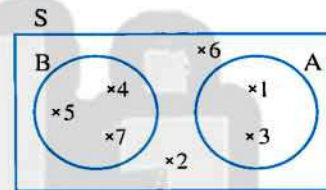
then $P(B - A) = \dots\dots\dots$

(a) $\frac{1}{2}$

(b) $\frac{5}{7}$

(c) $\frac{2}{7}$

(d) $\frac{3}{7}$



[b] Find $n(X)$ in the simplest form , showing the domain of n where :

$$n(X) = \frac{2X^2 - X - 6}{X^2 - 3X} \div \frac{4X^2 - 9}{2X^2 - 3X}$$

2 [a] Choose the correct answer :

1 If the domain of the function $n : n(X) = \frac{X+2}{4X^2 + kX + 9}$ is $\mathbb{R} - \left\{ \frac{-3}{2} \right\}$, then the value of k =

(a) 15

(b) - 15

(c) 12

(d) - 12

2 If $6^X = 12$, then $6^{X+1} = \dots\dots\dots$

(a) 66

(b) 13

(c) 27

(d) 72

3 The S.S. of the inequality : $-X < 3$ in \mathbb{R} is

(a) $[3, \infty[$

(b) $]3, \infty[$

(c) $]-3, \infty[$

(d) $[-3, \infty[$

[b] If $n_1(X) = \frac{X}{X^2 - X}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$, prove that : $n_1 = n_2$

3 [a] Find in \mathbb{R} the solution set of the equation : $3X^2 + 1 = 5X$,

rounding the results to two decimal places.

[b] If $n_1(x) = \frac{x^2 - 2x - 15}{x^2 - 9}$, $n_2(x) = \frac{6 - ax}{x^2 - 6x + 9}$, where the set of zeroes of n_2 is $\{-3\}$

1 Find the value of a

2 Find $n(x)$ where $n(x) = n_1(x) - n_2(x)$ in the simplest form, showing the domain of n

4 [a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$3x + 2y = 4, \quad x - 3y = 5$$

[b] If A and B are two events from the sample space S of a random experiment

, $P(A) = \frac{1}{2}$, $2P(B) = P(\bar{B})$, then find $P(A \cup B)$ in each of the following cases :

1 $P(A \cap B) = \frac{1}{6}$

2 A, B are mutually exclusive events.

5 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$x - 2y - 1 = 0, \quad x^2 - xy = 0$$

[b] If $n(x) = \frac{x^2 - 3x}{(x-3)(x^2 + 2)}$, then find : $n^{-1}(x)$ and identify the domain of n^{-1}

14

El-Beheira Governorate



Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from the given ones :

1 If $x^2 - y^2 = 12$, $x - y = 3$, then $x + y = \dots\dots\dots$

(a) 3

(b) 4

(c) 12

(d) 15

2 If $3a = \sqrt{4}b$, then $\frac{a}{b} = \dots\dots\dots$

(a) $\frac{2}{3}$

(b) $\frac{3}{2}$

(c) $\frac{3}{4}$

(d) $\frac{4}{3}$

3 If $5x = 5^3$, then $\frac{4}{5}x = \dots\dots\dots$

(a) 10

(b) 15

(c) 20

(d) 25

4 The number of solution of the two equations $x + y = 1$ and $y + x = 2$ together in $\mathbb{R} \times \mathbb{R}$ is $\dots\dots\dots$

(a) zero

(b) 1

(c) 2

(d) 3

5 The common domain of the functions n_1, n_2 where $n_1(x) = \frac{x+2}{x^2-4}$, $n_2(x) = \frac{1}{x+1}$ is $\dots\dots\dots$

(a) $\{-2, -1, 2\}$

(b) $\mathbb{R} - \{-1, 2\}$

(c) $\mathbb{R} - \{-2, -1, 2\}$

(d) \mathbb{R}

6 If $A \subset B$, then $P(A \cup B) = \dots\dots\dots$

(a) zero

(b) $P(A)$

(c) $P(B)$

(d) $P(A \cap B)$

Algebra and Probability

- 2 [a] Find the solution set of the following two equations together in $\mathbb{R} \times \mathbb{R}$:

$$y - x = 2 \quad , \quad x^2 + xy - 4 = 0$$

- [b] Find $n(x)$ in the simplest form , showing the domain of n where :

$$n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$$

- 3 [a] Two acute angles in a right-angled triangle. The difference between their measures is 50° . Find the measure of each angle.

- [b] If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$, find :

1 $n^{-1}(x)$ in the simplest form , showing the domain of n^{-1}

2 The value of x if $n^{-1}(x) = 3$

- 4 [a] By using the general formula , find the solution set of the following equation in \mathbb{R} :

$$3x^2 = 5x - 1 \text{ (rounding the results to two decimal places).}$$

- [b] If $n_1(x) = \frac{2x}{2x + 4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, then prove that : $n_1 = n_2$

- 5 [a] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x - 3}{x^2 - 7x + 12} - \frac{4}{x^2 - 4x}$$

- [b] If A and B are two events from the sample space of a random experiment and

$$P(A) = 0.8 \quad , \quad P(B) = 0.7 \quad , \quad P(A \cap B) = 0.6$$

, then find : 1 $P(\bar{A})$

2 $P(A \cup B)$

15 El-Fayoum Governorate



Answer the following questions : (Using calculators is allowed)

- 1 Choose the correct answer :

- 1 In the equation : $ax^2 + bx + c = 0$, if : $b^2 - 4ac > 0$, then the equation has roots in \mathbb{R}

(a) 1 (b) 2 (c) zero (d) ∞

- 2 If $3^x = 4$, $4^y = 12$, then $\frac{xy}{x+1} = \dots\dots\dots$

(a) 2 (b) 1 (c) $\frac{1}{2}$ (d) $\frac{3}{4}$

- 3 If $n(x) = \frac{x^2 - 2x}{(x - 2)(x^2 + 2)}$, then the domain of n^{-1} is

(a) \mathbb{R} (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{0\}$ (d) $\mathbb{R} - \{0, 2\}$

- 4 If $2^7 \times 3^7 = 6^k$, then $k = \dots\dots\dots$
 (a) 14 (b) 7 (c) 6 (d) 5
- 5 If A and B are two mutually exclusive events from the sample space S of a random experiment, then $P(A - B) = \dots\dots\dots$
 (a) $P(A)$ (b) $P(\bar{A})$ (c) $P(B)$ (d) $P(\bar{B})$
- 6 The rule which describes the pattern $\left(\frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \frac{4}{5}, \dots\right)$ where $n \in \mathbb{Z}_+$ is $\dots\dots\dots$
 (a) $\frac{2}{n+1}$ (b) $n + \frac{1}{2}$ (c) $\frac{n}{n+1}$ (d) $\frac{2n-1}{n+1}$

- 2 [a] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following pair of equations :

$$3x - y + 4 = 0, \quad y = 2x + 3$$

- [b] Reduce $n(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$ to the simplest form, showing the domain of n

- 3 [a] By using the general formula, find in \mathbb{R} the solution set of the equation :

$$x^2 + 3x + 5 = 0$$

- [b] If $n(x) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x + 7}{x - 2}$, find the simplest form of $n(x)$, showing the domain, then find $n(1)$

- 4 [a] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^3 - x^2 - 6x}{x^3 - 9x}$, show whether $n_1 = n_2$ or not. (give a reason)

- [b] The sum of two real numbers is 9, and the difference between their squares equals 45, find the two numbers.

- 5 [a] If the set of zeroes of the function $f : f(x) = ax^2 + bx + 15$ is $\{3, 5\}$, find the values of a and b

- [b] If A and B are two events of the sample space of a random experiment

$$P(A) = P(\bar{A}), \quad P(A \cap B) = \frac{1}{16}, \quad P(B) = \frac{5}{8} P(A)$$

- , find : 1 $P(B)$ 2 $P(A \cup B)$

16

Beni Suef Governorate



Answer the following questions : (Calculator is allowed)

- 1 Choose the correct answer from those given :

- 1 If a coin is tossed once, then the probability of appearing a tail equals $\dots\dots\dots$

- (a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) 1

Algebra and Probability

- 2 The set of zeroes of the function f where $f(x) = \frac{x-3}{x-2}$ is
- (a) {zero} (b) {2} (c) {3} (d) {2, 3}
- 3 The equation $3x + 4y + x^2y = 5$ is of the degree.
- (a) zero (b) first (c) second (d) third
- 4 The domain of the function f where $f(x) = \frac{x-3}{2}$ is
- (a) \mathbb{R} (b) $\mathbb{R} - \{-2\}$ (c) $\mathbb{R} - \{3\}$ (d) $\mathbb{R} - \{-2, 3\}$
- 5 If $x + y = xy = 10$, then $x^2y + xy^2 =$
- (a) 10 (b) 20 (c) 30 (d) 100
- 6 The solution set of the two equations : $y = 4$, $x + y = 7$ together in $\mathbb{R} \times \mathbb{R}$ is
- (a) (3, 4) (b) (4, 3) (c) {(3, 4)} (d) {(4, 3)}

- 2 [a] Find in \mathbb{R} by using the general formula , the solution set of the equation :

$$x^2 - 2(x + 1) = 0$$

- [b] If $n_1(x) = \frac{5x}{5x+25}$, $n_2(x) = \frac{x^2+5x}{x^2+10x+25}$, then prove that : $n_1 = n_2$

- 3 [a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x + y = 7 \quad , \quad x^2 + y^2 = 25$$

- [b] Find $n(x)$ in its simplest form , showing the domain where :

$$n(x) = \frac{x^2}{x^2 - 3x} \div \frac{3x}{x^2 - 9}$$

- 4 [a] If A , B are two events from the sample space of a random experiment and

$$P(A) = 0.7 \quad , \quad P(B) = 0.5 \quad \text{and} \quad P(A \cap B) = 0.3$$

, find : $P(\bar{A})$, $P(A - B)$ and $P(A \cup B)$

- [b] If the set of zeroes of the function f where $f(x) = x^2 - 10x + a$ is {5}
 , then find the value of a

- 5 [a] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

$$3x + y = 3 \quad , \quad 2x - y = 7$$

- [b] Find $n(x)$ in its simplest form , showing the domain where :

$$n(x) = \frac{x^2 + x + 1}{x^3 - 1} + \frac{x^2 - x - 2}{x^2 - 1}$$

17 El-Menia Governorate



Answer the following questions : (Calculators are allowed)

1 Choose the correct answer from those given :

1 If $k < \text{zero}$, which of the following quantities is the greatest in the numerical value ?

- (a) $5 - k$ (b) $5 + k$ (c) $5k$ (d) $\frac{5}{k}$

2 If $a + b = 3$, $a^2 - a + b^2 = 5$, then $a^3 + b^3 = \dots\dots\dots$

- (a) 8 (b) 9 (c) 15 (d) 25

3 Half the number $4^6 = \dots\dots\dots$

- (a) 2^3 (b) 2^6 (c) 4^3 (d) 2^{11}

4 The S.S of the two equations $x = 3$, $y = 4$ in $\mathbb{R} \times \mathbb{R}$ is $\dots\dots\dots$

- (a) $\{(3, 4)\}$ (b) $\{(4, 3)\}$ (c) \mathbb{R} (d) \emptyset

5 If A , B are two mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) = \dots\dots\dots$

- (a) \emptyset (b) zero (c) 0.5 (d) 1

6 The simplest form of the function $f : f(x) = \frac{2x}{x+1} + \frac{x}{x+1}$ is $\dots\dots\dots$

- (a) $\frac{3x}{x+1}$ (b) 3 (c) 2 (d) $\frac{2}{x+1}$

2 [a] Find the S.S. in \mathbb{R} for the equation : $3x^2 - 5x + 1 = 0$, using the general rule , rounding the result to one decimal place.

[b] Find $n(x)$ in the simplest form , showing the domain :

$$n(x) = \frac{x^3 - 8}{x^2 - 5x + 6} \div \frac{x^2 + 2x + 4}{x - 3}$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations : $2x + y = 1$, $x + 2y = 5$ algebraically.

[b] Find $n(x)$ in the simplest form showing the domain where :

$$n(x) = \frac{x^2 - 2x - 15}{x^2 - 9} - \frac{10 - 2x}{x^2 - 8x + 15}$$

4 [a] Find the S.S. in \mathbb{R}^2 of the two equations : $x + y = 2$, $\frac{1}{x} + \frac{1}{y} = 2$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$,

prove that : $n_1 = n_2$

Algebra and Probability

- 5 [a] If $n(X) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$, find : $n^{-1}(X)$, showing the domain.
- [b] If A, B are two events from the sample space of a random experiment
 $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$
 find : 1 $P(A \cup B)$ 2 $P(A - B)$

18

Assiut Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer :

- 1 If $\frac{1}{3}x = 8$, then $\frac{1}{6}x = \dots\dots\dots$
 (a) $\frac{4}{3}$ (b) 4 (c) 48 (d) 16
- 2 If there are an infinite number of solutions of the equations $x + 6y = 3$, $2x + ky = 6$ in $\mathbb{R} \times \mathbb{R}$, then $k = \dots\dots\dots$
 (a) 4 (b) 6 (c) 12 (d) 21
- 3 The set of zeroes of the function f where $f(x) = x^2 - 3$ is $\dots\dots\dots$
 (a) $\{\sqrt{3}\}$ (b) $\{-\sqrt{3}\}$ (c) $\{3\}$ (d) $\{-\sqrt{3}, \sqrt{3}\}$
- 4 $\frac{3}{\sqrt{5} + \sqrt{2}} = \dots\dots\dots$
 (a) $3\sqrt{5}$ (b) $2\sqrt{5}$ (c) $\sqrt{5} - \sqrt{2}$ (d) $\sqrt{5} + \sqrt{2}$
- 5 If the curve of the function f where $f(x) = x^2 - m$ passes through the point $(3, 0)$, then $m = \dots\dots\dots$
 (a) 3 (b) -3 (c) 6 (d) 9
- 6 If $X \subset S$ and \bar{X} is the complementary event to event X , then $P(X \cap \bar{X}) = \dots\dots\dots$
 (a) zero (b) S (c) \emptyset (d) 1

2 [a] Find the solution set of the two following equations algebraically in $\mathbb{R} \times \mathbb{R}$:

$$3x - y + 4 = 0 \quad , \quad y = 2x + 3$$

- [b] If $n(X) = \frac{x^2 - 49}{x^3 - 8} \div \frac{x+7}{x-2}$, then find $n(X)$ in the simplest form and identify the domain and find $n(1)$

3 [a] By using the general formula, find in \mathbb{R} the solution set of the equation :

$$x(x-1) = 5, \text{ rounding the results to one decimal place.}$$

[b] If $n_1(x) = \frac{x^2 - 4}{x^2 + x - 6}$, $n_2(x) = \frac{x^3 - x^2 - 6x}{x^3 - 9x}$

, **prove that** : $n_1(x) = n_2(x)$ for the values of x which belong to the common domain and find this domain.

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 2$, $x^2 + y^2 = 20$

[b] If $Z(f) = \{5\}$, $f(x) = x^3 - 3x^2 + a$, **find the value of** : a

5 [a] Find $n(x)$ in the simplest form , showing the domain of n :

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{x-3}{3-x}$$

[b] If $S = \{2, 3, 4, 5, 6, 7, 8\}$, $A = \{2, 4, 6, 8\}$, $B = \{2, 3, 5, 7\}$

, **find** : 1 $P(A)$, $P(\bar{B})$

2 $P(A \cup B)$

19

Souhag Governorate



Answer the following questions : (Calculators are allowed)

1 Choose the correct answer :

1 If $x \neq 0$, then $\frac{5x}{x^2+1} \div \frac{x}{x^2+1} = \dots\dots\dots$

(a) -5

(b) -1

(c) 1

(d) 5

2 $f: \mathbb{R} \longrightarrow \mathbb{R}$, $f(x) = ax^2 + bx + c$, where $a, b, c \in \mathbb{R}$, $a = 0$, $b \neq 0$ is a polynomial function of the degree in x

(a) second

(b) third

(c) first

(d) zero

3 If $2^x = \frac{1}{4}$, then $x = \dots\dots\dots$

(a) 2

(b) -2

(c) 1

(d) -1

4 $\sqrt[3]{3\frac{3}{8}} \dots\dots\dots \sqrt{2\frac{1}{4}}$

(a) =

(b) >

(c) <

(d) \neq

5 If there are an infinite number of solutions in $\mathbb{R} \times \mathbb{R}$ of the two equations : $x + 4y = 7$, $3x + ky = 21$, then $k = \dots\dots\dots$

(a) 4

(b) 7

(c) 21

(d) 12

6 If $A \subset S$ of a random experiment and $P(\bar{A}) = 2P(A)$, then $P(A) = \dots\dots\dots$

(a) $\frac{1}{2}$

(b) $\frac{2}{3}$

(c) $\frac{1}{3}$

(d) 1

Algebra and Probability

- 2 [a] By using the general formula (rounding the results to one decimal digit) , find in \mathbb{R} the solution set of the equation : $X(X-1) = 4$

[b] If $n_1(X) = \frac{X^2}{X^3 - X^2}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$, prove that : $n_1 = n_2$

- 3 [a] Find the solution set of the following equations in $\mathbb{R} \times \mathbb{R}$:

$$X - y = 0 \quad , \quad X^2 + Xy + y^2 = 27$$

- [b] If $n(X) = \frac{X^2 - 2X}{X^2 - 3X + 2}$, then find : $n^{-1}(X)$ in the simplest form showing the domain of n^{-1}

- 4 [a] Solve in $\mathbb{R} \times \mathbb{R}$: $2X - y = 5$, $X + y = 4$

[b] Simplify : $n(X) = \frac{X^2 + 2X}{X^2 - 4} - \frac{2X - 6}{X^2 - 5X + 6}$, showing the domain.

- 5 [a] Simplify : $n(X) = \frac{X^3 - 8}{X^2 + X - 6} \times \frac{X + 3}{X^2 + 2X + 4}$, showing the domain.

- [b] If A , B are two mutually exclusive events of a random experiment and $P(A) = 0.3$, $P(B) = 0.6$, $P(A \cap B) = 0.2$, find : $P(\bar{A})$, $P(A \cup B)$

20

Qena Governorate



Answer the following questions : (Calculators are permitted)

- 1 Choose the correct answer :

- 1 The domain of the function f where $f(X) = \frac{X-2}{X^2+1}$ is

(a) $\mathbb{R} - \{-1\}$ (b) $\mathbb{R} - \{1, -1\}$ (c) $\mathbb{R} - \{1\}$ (d) \mathbb{R}

- 2 $10 + (10)^2 + (10)^3 = \dots\dots\dots$

(a) 1000 (b) 3000 (c) 1110 (d) 1010

- 3 The two straight lines : $X - y = 0$, $3X + 2y = 0$ intersect at the point

(a) (0 , 0) (b) (1 , 1) (c) (3 , 0) (d) (0 , 2)

- 4 $\sqrt{64 + 36} = 8 + \dots\dots\dots$

(a) 9 (b) 2 (c) 6 (d) 10

- 5 If $P(A) = 3P(\bar{A})$, then $P(A) = \dots\dots\dots$

(a) $\frac{1}{4}$ (b) $\frac{1}{2}$ (c) $\frac{3}{4}$ (d) $\frac{1}{3}$

- 6 If $ab = 3$, $ab^2 = 12$, then $b = \dots\dots\dots$

(a) 4 (b) 2 (c) -2 (d) ± 2

- 2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - 2 = 0 \quad , \quad y^2 - 3xy + 5 = 0$$

- [b] Find $n(x)$ in the simplest form , showing the domain where : $n(x) = \frac{5}{x-3} + \frac{4}{3-x}$

- 3 [a] Graph the function f where $f(x) = x^2 - 2x + 3$ over the interval $[-1, 3]$
 , then from the graph find in \mathbb{R} the solution set of the equation $x^2 - 2x + 3 = 0$

- [b] If $n(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4}$, find $n^{-1}(x)$, showing the domain of n^{-1} , then find $n^{-1}(0)$

- 4 [a] Find in \mathbb{R} the solution set of the equation :

$$2x^2 - 5x + 1 = 0 \quad , \quad \text{approximating the results to two decimals.}$$

- [b] If $n_1(x) = \frac{x^3 + 1}{x^3 - x^2 + x}$, $n_2(x) = \frac{x^3 + x^2 + x + 1}{x^3 + x}$, prove that : $n_1 = n_2$

- 5 [a] If A and B are two events from the sample space S , $P(A) = 0.8$, $P(B) = 0.7$
 , $P(A \cap B) = 0.6$, find :

1 $P(\bar{A})$

2 $P(A \cup B)$

3 $P(A - B)$

- [b] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{x^2 + 2x}{x^3 - 27} \div \frac{x + 2}{x^2 + 3x + 9}$$

21

Luxor Governorate



Answer the following questions :

- 1 Choose the correct answer :

- 1 If $f(x) = 9$, then $3f(-x) = \dots\dots\dots$

(a) -3

(b) 6

(c) -12

(d) 27

- 2 The set of zeroes of $f : f(x) = \text{zero}$ is $\dots\dots\dots$

(a) \emptyset

(b) \mathbb{R}

(c) $\mathbb{R} - \{0\}$

(d) zero

- 3 If $xy = 4$, $xz = 4$, $yz = 4$, where $x, y, z \in \mathbb{R}^+$, then $xyz = \dots\dots\dots$

(a) 64

(b) 12

(c) 8

(d) 4

- 4 If A , B are two events of the sample space of a random experiment , $A \subset B$, $P(A) = 0.2$
 and $P(B) = 0.6$, then $P(B - A) = \dots\dots\dots$

(a) 0.2

(b) 0.4

(c) 0.6

(d) 0.8

- 5 $\frac{1}{3}$ the number $(27)^3$ is $\dots\dots\dots$

(a) 3^3

(b) 3^4

(c) 3^6

(d) 3^8

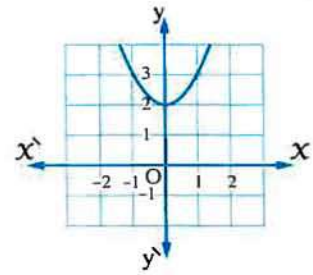
Algebra and Probability

6 From the opposite figure :

The S.S. of $f(x) = 0$

in \mathbb{R} is

- (a) \emptyset (b) $\{2\}$
(c) $\{0\}$ (d) $\{(0, 2)\}$



2 [a] Find the common domain of the functions defined by the following rules :

$$\frac{x-4}{x^2-5x+6}, \quad \frac{2x}{x^3-9x}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $y + 2x = 7$, $2x^2 + x + 3y = 19$

3 [a] Find $n(x)$ in the simplest form and state the domain :

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{x-3}{3-x}$$

[b] A class has 40 students , 30 of them succeeded in math , 24 succeeded in science and 20 of them succeeded in both math and science. **If one student is chosen at random , find the probability that the student :**

- 1 Succeeded in math. 2 Succeeded in science only.
3 Succeeded in one of them at least.

4 [a] Find in \mathbb{R} the solution set of : $2x^2 - x - 2 = 0$ by using the general rule where $(\sqrt{17} \approx 4.12)$

[b] If $n_1(x) = \frac{x}{x^2-1}$, $n_2(x) = \frac{5x}{5x^2-5}$, prove that : $n_1 = n_2$

5 [a] Find $n(x)$ in the simplest form and state the domain if :

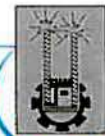
$$n(x) = \frac{x^2-3x}{2x^2-x-6} \div \frac{2x^2-3x}{4x^2-9}$$

[b] Find graphically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x + 2y = 8 \quad , \quad 3x + y = 9$$

22

Aswan Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer :

1 The solution set of the two equations $x + y = 0$, $y - 5 = 0$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) \emptyset (b) \mathbb{R} (c) $\{(-5, 5)\}$ (d) $\{(5, -5)\}$

- 2 If $2^3 \times 5^3 = 10^x$, then $x = \dots\dots\dots$
 (a) zero (b) 3 (c) 6 (d) 9
- 3 If $a^2 - b^2 = 6$, $a - b = \sqrt{3}$, then $(a + b)^2 = \dots\dots\dots$
 (a) 3 (b) 6 (c) 9 (d) 12
- 4 If $(5, x - 4) = (y, 2)$, then $x + y = \dots\dots\dots$
 (a) 6 (b) 8 (c) 11 (d) 25
- 5 If $f(x) = x^2 + x + a$ and the set of zeroes of the function f is $\{1, -2\}$, then $a = \dots\dots\dots$
 (a) 2 (b) 1 (c) -1 (d) -2
- 6 If $A \subset B$, then $P(A \cup B) = \dots\dots\dots$
 (a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cap B)$

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$3x - y = -4, \quad y - 2x = 3$$

[b] Find $n(x)$ in the simplest form, showing the domain of n where :

$$n(x) = \frac{x^2 + 4x + 3}{x^3 - 27} \div \frac{x + 3}{x^2 + 3x + 9}$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - y = 1, \quad x^2 + y^2 = 25$$

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 3x + 2}$

, find : $n^{-1}(x)$ in the simplest form, showing the domain of n^{-1}

4 [a] Using the general rule, find the solution set of the following equation in \mathbb{R} :

$$2x^2 - 5x + 1 = 0$$

[b] Find $n(x)$ in the simplest form, showing the domain of n where :

$$n(x) = \frac{x^2 + 2x}{x^2 - 4} - \frac{2x - 6}{x^2 - 5x + 6}$$

5 [a] If $n_1(x) = \frac{2x}{2x + 8}$, $n_2(x) = \frac{x^2 + 4x}{x^2 + 8x + 16}$, prove that : $n_1 = n_2$

[b] If A, B are two mutually exclusive events and $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$

, find : $P(B)$

23

New Valley Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

- 1 The degree of the function $f : f(x) = x + x^2 - 5$ is the
 (a) first (b) second (c) third (d) fourth
- 2 The set of zeroes of the function $f : f(x) = 7$ is
 (a) \emptyset (b) $\{7\}$ (c) \mathbb{R} (d) $\mathbb{R} - \{7\}$
- 3 If $a + b = 3$ and $(a + b)(a + 1) = 15$, then $ab =$
 (a) -4 (b) 4 (c) -6 (d) 6
- 4 The number of solutions of the equation : $x = 3$ in $\mathbb{R} \times \mathbb{R}$ is
 (a) zero (b) 1 (c) 2 (d) an infinite number.
- 5 If A and B are two mutually exclusive events of a random experiment, then :
 $P(A \cap B) =$
 (a) $P(A)$ (b) \emptyset (c) zero (d) $P(B)$
- 6 If n_1 and n_2 are two algebraic fractions, the domain of $n_1 = \mathbb{R} - X_1$
 (where X_1 is the set of zeroes of the denominator of n_1) and the domain of $n_2 = \mathbb{R} - X_2$
 (where X_2 is the set of zeroes of the denominator of n_2)
 , then the common domain of n_1 and n_2 equals
 (a) $X_1 \cup X_2$ (b) $X_1 \cap X_2$
 (c) $(\mathbb{R} - X_1) \cup (\mathbb{R} - X_2)$ (d) $(\mathbb{R} - X_1) \cap (\mathbb{R} - X_2)$

2 [a] Find $n(x)$ in its simplest form, showing the domain of n :

$$n(x) = \frac{x^2 - 4}{x^2 + 5x + 6}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :

$$x^2 + y^2 = 17 \quad , \quad y - x = 3$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations algebraically :

$$3x - 2y = 4 \quad , \quad x + 3y = 5$$

[b] Find $n(x)$ in its simplest form, showing the domain of n :

$$n(x) = \frac{x}{x+2} \div \frac{x^2 - 2x}{\frac{1}{2}x^2 - 2}$$

4 [a] If $n_1(X) = \frac{X^3 - 1}{X^3 + X^2 + X}$, $n_2(X) = \frac{X^3 - X^2 + X - 1}{X^3 + X}$

, then prove that : $n_1 = n_2$

[b] Find $n(X)$ in the simplest form , showing the domain of n :

$$n(X) = \frac{3X}{X^2 - 3X} - \frac{X}{X - 3}$$

5 [a] If A and B are two events from the sample space of a random experiment , and

$$P(A) = \frac{1}{5} , P(B) = \frac{3}{5} , P(A \cap B) = \frac{1}{10} , \text{ then find :}$$

1 $P(\hat{A})$

2 $P(A \cup B)$

3 $P(B - A)$

[b] Draw the graph of the function $f : f(X) = X^2 - 2X + 1$ in the interval $[-2, 4]$

, then from the graph find in \mathbb{R} the solution set of the equation : $X^2 - 2X + 1 = 0$

24 South Sinai Governorate



Answer the following questions :

1 Choose the correct answer from those given :

1 If $\frac{X}{y} = \frac{3}{4}$, then $\frac{4X}{3y} = \dots\dots\dots$

(a) 1

(b) $\frac{4}{3}$

(c) $\frac{9}{16}$

(d) $\frac{16}{9}$

2 If $X^2 = 25$, then $X = \dots\dots\dots$

(a) -5

(b) ± 5

(c) 5

(d) 10

3 If $X + 3y = 7$, then $X + 3(y + 5) = \dots\dots\dots$

(a) 3

(b) 7

(c) 22

(d) 21

4 The probability of the impossible event equals

(a) 1

(b) $\frac{1}{2}$

(c) -1

(d) zero

5 The domain of $f : f(X) = \frac{X+5}{X^2-4}$ is

(a) \mathbb{R}

(b) $\mathbb{R} - \{-2, 2\}$

(c) $\mathbb{R} - \{-2\}$

(d) $\mathbb{R} - \{2\}$

6 If A and B are mutually exclusive events , then $P(A \cap B) = \dots\dots\dots$

(a) \emptyset

(b) zero

(c) 0.56

(d) 1

2 [a] Find in \mathbb{R} the solution set of the equation : $X^2 - 2X - 6 = 0$ by using the formula , approximating the result to the nearest two decimal places.

Algebra and Probability

[b] Find $n(x)$ in the simplest form, showing the domain of n :

$$n(x) = \frac{x}{x+2} + \frac{2x^3}{x^3+2x^2}$$

3 [a] Find $n(x)$ in the simplest form, showing the domain of n :

$$n(x) = \frac{x^2+2x}{x^3-8} \times \frac{x^2+2x+4}{x+2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations algebraically :

$$2x - y = 3 \quad , \quad x + 2y = 4$$

4 [a] If $n_1(x) = \frac{x}{x^2+x}$, $n_2(x) = \frac{x^4-x^3+x^2}{x^5+x^2}$, prove that : $n_1 = n_2$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - y = 7 \quad , \quad xy = 60$$

5 [a] Find $n(x)$ in the simplest form, showing the domain of n where :

$$n(x) = \frac{x+1}{x^2+3x+2} - \frac{x+2}{x^2-4}$$

[b] If A and B are mutually exclusive events of the sample space of a random experiment and $P(A) = \frac{1}{4}$, $P(A \cup B) = \frac{5}{12}$, find : $P(B)$

25 North Sinai Governorate



Answer the following questions :

1 Choose the correct answer from those given :

1 One of the solutions of the inequality : $2x - 3 > 3$ where $x \in \mathbb{Z}$ is

- (a) $x = 3$ (b) $x = -3$ (c) $x = 7$ (d) $x = -7$

2 If $x - y = 3$, $x + y = 9$, then $y =$

- (a) 6 (b) -6 (c) 3 (d) -3

3 If $a = \sqrt{3}$, $b = \frac{1}{\sqrt{3}}$, then $a^{50} \times b^{51} =$

- (a) 3 (b) $\frac{1}{3}$ (c) $\sqrt{3}$ (d) $\frac{1}{\sqrt{3}}$

4 If $n(x) = \frac{x}{x+5}$, then the domain of $n^{-1} =$

- (a) \mathbb{R} (b) $\mathbb{R} - \{0\}$ (c) $\mathbb{R} - \{5\}$ (d) $\mathbb{R} - \{0, -5\}$

5 If $x^2 - y^2 = 15$, $x - y = 3$, then $x + y =$

- (a) 5 (b) 13 (c) 18 (d) 45

- 6 If a regular die is tossed once , the probability of appearance of a number less than 3 equals

(a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{2}{3}$

- 2 [a] If A , B are two events of a random experiment and

$$P(A) = \frac{1}{2} , P(A \cap B) = \frac{1}{5} , P(B) = \frac{2}{5}$$

, find : 1 $P(A \cup B)$

2 $P(A - B)$

- [b] Find the common domain of n_1 , n_2 : if $n_1(X) = \frac{-1}{X^2 - 9}$, $n_2(X) = \frac{7}{X}$

- 3 [a] By using the general rule , find in \mathbb{R} the solution set of the equation : $X^2 - 2X = 4$, rounding the results to two decimal places.

- [b] Find $n(X)$ in the simplest form , showing the domain :

$$n(X) = \frac{X^2 - 2X}{X^2 - 4} + \frac{2X + 6}{X^2 + 5X + 6}$$

- 4 [a] Find the solution set of the following two equations in $\mathbb{R} \times \mathbb{R}$:

$$X - y = 0 , Xy = 16$$

- [b] If $n_1(X) = \frac{X^2}{X^3 - X^2}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$, prove that : $n_1 = n_2$

- 5 [a] If $n(X) = \frac{X^2 - 2X + 1}{X^3 - 1} \div \frac{X - 1}{X^2 + X + 1}$

, find : $n(X)$ in the simplest form , showing the domain of n

- [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :

$$X + y = 4 , 2X - y = 2$$

26

Red Sea Governorate



Answer the following questions : (Calculators are allowed)

- 1 Choose the correct answer from those given :

- 1 The solution set of the two equations : $X + 2 = 0$, $y = 3$ in $\mathbb{R} \times \mathbb{R}$ is

(a) $\{(2, 3)\}$ (b) $\{(3, 2)\}$ (c) $\{(-2, 3)\}$ (d) $\{(3, -2)\}$

- 2 If $2^5 \times 3^5 = 6^m$, then $m =$

(a) 10 (b) 5 (c) 6 (d) 25

- 3 If $A \subset S$ of a random experiment , $P(\bar{A}) = 2P(A)$, then $P(A)$

(a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) $\frac{2}{3}$ (d) 1

Algebra and Probability

- 4 If $(5, x-4) = (y, 3)$, then $x + y = \dots\dots\dots$
 (a) 25 (b) 12 (c) 8 (d) 6
- 5 The set of zeroes of f where $f(x) = \text{zero}$ is $\dots\dots\dots$
 (a) \emptyset (b) zero (c) \mathbb{R} (d) $\mathbb{R} - \{0\}$
- 6 $(-1)^{15} + (-1)^{14} = \dots\dots\dots$
 (a) 1 (b) 2 (c) -2 (d) zero

- 2 [a] Find the S.S of the following two equations in $\mathbb{R} \times \mathbb{R}$:

$$2x - y = 3, \quad x + 2y = 4$$

- [b] Find $n(x)$ in the simplest form, showing the domain : $n(x) = \frac{x^2}{x-1} + \frac{x}{1-x}$

- 3 [a] By using the general rule, solve the equation : $x^2 - x = 4$ in \mathbb{R}
 , approximating the result to the nearest two decimals

- [b] Prove that $n_1 = n_2$ if : $n_1(x) = \frac{x^3 + 1}{x^3 - x^2 + x}$, $n_2(x) = \frac{x^3 + x^2 + x + 1}{x^3 + x}$

- 4 [a] Find the S.S. in $\mathbb{R} \times \mathbb{R}$ of the two equations : $x - y = 1$, $x^2 + y^2 = 25$

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 5x + 6}$

- 1 Find : $n^{-1}(x)$ and identify the domain of n^{-1}
 2 If $n^{-1}(x) = 2$, what is the value of x ?

- 5 [a] Find $n(x)$ in the simplest form, showing the domain where :

$$n(x) = \frac{x^3 - 8}{x^2 + x - 6} \times \frac{x + 3}{x^2 + 2x + 4}$$

- [b] If A and B are two events from the sample space of a random experiment and

$$P(A) = 0.3, \quad P(B) = 0.6, \quad P(A \cap B) = 0.2$$

, find : 1 $P(A \cup B)$

2 $P(A - B)$

27

Matrouh Governorate



Answer the following questions :

- 1 Choose the correct answer from those given :

- 1 The two straight lines : $x + 2y = 1$, $2x + 4y = 6$ are $\dots\dots\dots$
 (a) parallel. (b) intersecting.
 (c) perpendicular. (d) intersecting and perpendicular.

- 2 The solution set of the equation : $x^2 = 2x$ in \mathbb{Z} is
- (a) $\{2\}$ (b) $(0, 2)$ (c) $\{0, 2\}$ (d) $\{(0, 2)\}$
- 3 The intersection point of the two straight lines : $x = 1$ and $y - 2 = 0$ lies on the quadrant.
- (a) first. (b) second. (c) third. (d) fourth.
- 4 If $A \subset B$, then $P(A \cup B) = \dots\dots\dots$
- (a) $P(A)$ (b) $P(B)$ (c) $P(A \cap B)$ (d) zero
- 5 If x is a negative number, then the largest number from the following is
- (a) $5 + x$ (b) $5x$ (c) $5 - x$ (d) $\frac{5}{x}$
- 6 The set of zeroes of the function f where $f(x) = 4$ is
- (a) zero (b) $\{4\}$ (c) $\{0, 4\}$ (d) \emptyset

- 2 [a] By using the general formula , find in \mathbb{R} the solution set of the equation :

$x + \frac{1}{x} + 3 = 0$ where $x \neq 0$, rounding the results to two decimal places.

- [b] If $n(x) = \frac{x^2 - 1}{x^2 - x}$, then reduce $n(x)$ to the simplest form , showing the domain of n

- 3 [a] Simplify : $n(x) = \frac{x-1}{x^2-1} \div \frac{x^2-5x}{x^2-4x-5}$, showing the domain.

- [b] If the sum of two positive numbers is 9 , and the difference between their squares is 27 , find the two numbers.

- 4 [a] If A, B are two events from the sample space of a random experiment and

$$P(A) = 0.3 \quad , \quad P(B) = 0.6 \quad , \quad P(A \cap B) = 0.2$$

, find : 1 $P(A \cup B)$

2 $P(A - B)$

- [b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$, then prove that : $n_1 = n_2$

- 5 [a] Find $n(x)$ in the simplest form , showing the domain where :

$$n(x) = \frac{3x}{x^2 - x - 2} + \frac{x-1}{1-x^2}$$

- [b] Find the solution set of the following two equations graphically in $\mathbb{R} \times \mathbb{R}$:

$$y = x + 4 \quad , \quad x + y = 4$$

Algebra and Probability

Answers of school book examinations in algebra and probability

Model 1

1

- 1 b 2 a 3 d 4 c 5 b 6 a

2

[a] $\therefore 2x^2 - 5x + 1 = 0$

$\therefore a = 2, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$

$\therefore x = 2.3 \text{ or } x = 0.2$

$\therefore \text{The S.S.} = \{2.3, 0.2\}$

[b] $\therefore n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{3, 4, 0\}$

$\therefore n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$

3

[a] $\therefore x - y = 0 \quad \therefore x = y \quad (1)$

$\therefore x^2 + xy + y^2 = 27 \quad (2)$

Substituting from (1) in (2):

$\therefore y^2 + y^2 + y^2 = 27 \quad \therefore 3y^2 = 27$

$\therefore y^2 = 9 \quad \therefore y = 3 \text{ or } y = -3$

Substituting in (1): $\therefore x = 3 \text{ or } x = -3$

$\therefore \text{The S.S.} = \{(3, 3), (-3, -3)\}$

[b] $\therefore n(x) = \frac{(x+3)(x+1)}{(x-3)(x^2+3x+9)} \div \frac{x+3}{x^2+3x+9}$

$\therefore \text{The domain of } n = \mathbb{R} - \{3, -3\}$

$\therefore n(x) = \frac{(x+3)(x+1)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+3} = \frac{x+1}{x-3}$

$\therefore n(2) = \frac{2+1}{2-3} = \frac{3}{-1} = -3$

$\therefore n(-3) \text{ undefined because } -3 \notin \text{the domain of } n$

4

[a] Let the length be x cm. and the width be y cm.

$\therefore x = y + 4 \quad (1)$

$\therefore 28 = 2(x + y) \quad \therefore x + y = 14 \quad (2)$

Substituting from (1) in (2):

$\therefore y + 4 + y = 14 \quad \therefore 2y = 10 \quad \therefore y = 5$

Substituting in (1): $\therefore x = 9$ $\therefore \text{The length} = 9 \text{ cm. , the width} = 5 \text{ cm.}$

$\therefore \text{The area} = 9 \times 5 = 45 \text{ cm}^2$

[b] 1 $\therefore n(x) = \frac{x(x-2)}{(x-2)(x-1)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x-1)}{x(x-2)}$

$\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 1, 2\}$

$\therefore n^{-1}(x) = \frac{x-1}{x}$

2 $\therefore n^{-1}(x) = 3 \quad \therefore \frac{x-1}{x} = 3$

$\therefore 3x = x - 1 \quad \therefore 3x - x = -1$

$\therefore 2x = -1 \quad \therefore x = \frac{-1}{2}$

5

[a] $\therefore n_1(x) = \frac{x^2}{x^2(x-1)}$

$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\} \quad (1)$

$\therefore \therefore n_1(x) = \frac{1}{x-1}$

$\therefore n_2(x) = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$

$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\} \quad (2)$

$\therefore n_2(x) = \frac{1}{x-1}$

From (1) and (2): $\therefore n_1 = n_2$

[b] 1 $P(A \cap B) = \frac{2}{6} = \frac{1}{3}$

2 $P(A - B) = \frac{1}{6}$

3 The probability of non-occurrence of the event $A = \frac{3}{6} = \frac{1}{2}$

Model 2

1

1 a 2 d 3 a 4 b 5 c 6 a

2

[a] $\therefore 3x^2 - 5x + 1 = 0$

$\therefore a = 3, b = -5, c = 1$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{25 - 12}}{6}$$

$$= \frac{5 \pm \sqrt{13}}{6}$$

$\therefore x = 1.43 \text{ or } x = 0.23$

$\therefore \text{The S.S.} = \{1.43, 0.23\}$

[b] $\therefore n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x+3)} \times \frac{x+3}{x^2+2x+4}$

$\therefore \text{The domain of } n = \mathbb{R} - \{2, -3\}$

$\therefore n(x) = 1$

3

[a] $\therefore x - y = 1 \quad \therefore x = y + 1 \quad (1)$

$\therefore x^2 + y^2 = 25 \quad (2)$

Substituting from (1) in (2):

$\therefore (y+1)^2 + y^2 = 25$

$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$

$\therefore 2y^2 + 2y - 24 = 0 \quad \therefore y^2 + y - 12 = 0$

$\therefore (y-3)(y+4) = 0$

$\therefore y = 3 \text{ or } y = -4$

Substituting in (1): $\therefore x = 4 \text{ or } x = -3$

$\therefore \text{The S.S.} = \{(4, 3), (-3, -4)\}$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(A - B) = P(A) - P(A \cap B)$

$= 0.3 - 0.2 = 0.1$

4

[a] $\therefore 2x - y = 3 \quad \therefore y = 2x - 3 \quad (1)$

$\therefore x + 2y = 4 \quad (2)$

Substituting from (1) in (2):

$\therefore x + 2(2x - 3) = 4$

$\therefore x + 4x - 6 = 4 \quad \therefore 5x = 10 \quad \therefore x = 2$

Substituting in (1): $\therefore y = 1$

[b] $\therefore n(x) = \frac{x(x+3)}{(x+3)(x-3)} \div \frac{2x}{x+3}$

$\therefore \text{The domain of } n = \mathbb{R} - \{-3, 3, 0\}$

$\therefore n(x) = \frac{x}{x-3} \times \frac{x+3}{2x} = \frac{x+3}{2(x-3)}$

5

[a] $\therefore n(x) = \frac{x(x+2)}{(x-2)(x+2)} + \frac{x+3}{(x-2)(x-3)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, 3\}$

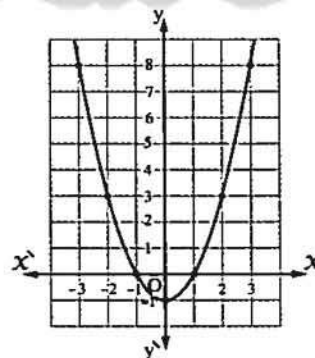
$$\therefore n(x) = \frac{x}{(x-2)} + \frac{x+3}{(x-2)(x-3)}$$

$$= \frac{x(x-3) + x+3}{(x-2)(x-3)} = \frac{x^2 - 3x + x + 3}{(x-2)(x-3)}$$

$$= \frac{x^2 - 2x + 3}{(x-2)(x-3)}$$

[b] $f(x) = x^2 - 1$

x	-3	-2	-1	0	1	2	3
y	8	3	0	-1	0	3	8



From the graph:

$\therefore \text{The S.S.} = \{-1, 1\}$

Algebra and Probability

Model examination for the merge students

1

1 0

4 second

2 $\frac{1}{x-2}$

5 second

3 $\frac{2}{3}$

6 {5}

2

1 a

4 b

2 b

5 c

3 c

6 a

3

1 x

4 ✓

2 x

5 x

3 ✓

6 ✓

4

1 {(2, 1)}

3 $\mathbb{R} - \{1, -1\}$

5 {5}

2 $\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ 4 $\frac{x}{x^2 + 4}$ 6 $\frac{1}{3}$

Answers of governorates' examinations of algebra & probability

1 Cairo

1

1 d 2 c 3 d 4 b 5 d 6 c

2

[a] Let x and y be two real numbers

$$\therefore x + y = 40 \quad (1)$$

$$\therefore x - y = 10 \quad (2)$$

$$\text{Adding (1) and (2): } \therefore 2x = 50 \quad \therefore x = 25$$

$$\text{Substituting in (1): } \therefore y = 15$$

$$\therefore \text{The two real numbers are } 25, 15$$

$$[b] \therefore n(x) = \frac{x}{x-2} - \frac{2(x+2)}{(x+2)(x-2)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2\}$$

$$\therefore n(x) = \frac{x}{x-2} - \frac{x}{x-2} = \frac{x-2}{x-2} = 1$$

3

$$[a] \therefore x - 3 = 0 \quad \therefore x = 3 \quad (1)$$

$$\therefore x^2 + y^2 = 25 \quad (2)$$

$$\text{Substituting from (1) in (2): } \therefore 9 + y^2 = 25$$

$$\therefore y^2 = 16 \quad \therefore y = 4 \text{ or } y = -4$$

$$\therefore \text{The S.S.} = \{(3, 4), (3, -4)\}$$

$$[b] \therefore n_1(x) = \frac{x^2}{x^2(x-1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\}$$

$$\therefore n_1(x) = \frac{1}{x-1}, \therefore n_2(x) = \frac{x^2 + x + 1}{(x-1)(x^2 + x + 1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{1\}$$

$$\therefore n_2(x) = \frac{1}{x-1}$$

$$\therefore n_1(x) = n_2(x) \text{ for all the values}$$

$$\text{of } x \in \mathbb{R} - \{0, 1\}$$

4

$$[a] \therefore n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x+3)(x-2)} \times \frac{x+3}{x^2 + 2x + 4}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -3\}, n(x) = 1$$

$$[b] \therefore 2x^2 + 5x - 6 = 0 \quad \therefore a = 2, b = 5, c = -6$$

$$\therefore x = \frac{-5 \pm \sqrt{(5)^2 - 4 \times 2 \times (-6)}}{2 \times 2} = \frac{-5 \pm \sqrt{73}}{4}$$

$$\therefore x \approx 0.9 \text{ or } x \approx -3.4$$

$$\therefore \text{The S.S.} = \{0.9, -3.4\}$$

5

$$[a] \quad 1 \quad P(A \cup B) = P(A) + P(B) - P(P \cap B)$$

$$= 0.7 + 0.5 - 0.3 = 0.9$$

$$2 \quad P(A - B) = P(A) - P(A \cap B) = 0.7 - 0.3 = 0.4$$

$$[b] \quad 1 \quad \therefore n(x) = \frac{x}{x+3} \quad \therefore n^{-1}(x) = \frac{x+3}{x}$$

$$\therefore \text{the domain of } n^{-1} = \mathbb{R} - \{0, -3\}$$

$$2 \quad \therefore n^{-1}(x) = 4 \quad \therefore \frac{x+3}{x} = 4$$

$$\therefore 4x = x + 3 \quad \therefore 3x = 3 \quad \therefore x = 1$$

2 Giza

1

1 c 2 d 3 b 4 a 5 c 6 b

2

$$[a] \therefore 2x^2 - 5x + 1 = 0 \quad \therefore a = 2, b = -5, c = 1$$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$$

$$\therefore x \approx 2.28 \text{ or } x \approx 0.22$$

$$\therefore \text{The S.S.} = \{2.28, 0.22\}$$

$$[b] \therefore n(x) = \frac{(x+2)(x-2)}{(x-2)(x^2 + 2x + 4)} \div \frac{(x+2)(x-3)}{x^2 + 2x + 4}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, 3\}$$

$$\therefore n(x) = \frac{(x+2)(x-2)}{(x-2)(x^2 + 2x + 4)} \times \frac{x^2 + 2x + 4}{(x+2)(x-3)} = \frac{1}{x-3}$$

3

[a] Let the lengths of the two sides of the right angle be x cm. and y cm.

$$\therefore x + y + 10 = 24 \quad \therefore x + y = 14$$

$$\therefore x = 14 - y \quad (1)$$

$$\therefore x^2 + y^2 = 100 \quad (2)$$

$$\text{Substituting from (1) in (2): } \therefore (14 - y)^2 + y^2 = 100$$

$$\therefore 196 - 28y + y^2 + y^2 - 100 = 0$$

$$\therefore 2y^2 - 28y + 96 = 0 \text{ (Dividing by 2)}$$

$$\therefore y^2 - 14y + 48 = 0 \quad \therefore (y - 6)(y - 8) = 0$$

$$\therefore y = 6 \quad \text{or} \quad y = 8$$

$$\text{Substituting in (1): } \therefore x = 8 \text{ or } x = 6$$

$$\therefore \text{The side lengths of the right angle are } 6 \text{ cm. and } 8 \text{ cm.}$$

Algebra and Probability

- [b] $\therefore A, B$ are two mutually exclusive events
 $\therefore P(A \cup B) = P(A) + P(B) = 0.2 + 0.5 = 0.7$
 $\therefore P(A - B) = P(A) = 0.2$

4

- [a] 1 $\therefore n(x) = \frac{x(x-3)}{(x-2)(x-3)}$
 $\therefore n^{-1}(x) = \frac{(x-2)(x-3)}{x(x-3)}$
 \therefore the domain of $n^{-1} = \mathbb{R} - \{0, 3, 2\}$
 $\therefore n^{-1}(x) = \frac{x-2}{x}$
 2 $\therefore n^{-1}(x) = 2 \quad \therefore \frac{x-2}{x} = 2$
 $\therefore x-2 = 2x \quad \therefore x = -2$

- [b] $\therefore x + 2y = 4$ (1)
 $\therefore 3x - y = 5$ (multiplying by 2)
 $\therefore 6x - 2y = 10$ (2)
 Adding (1) and (2): $\therefore 7x = 14 \quad \therefore x = 2$
 Substituting in (1): $\therefore y = 1$
 \therefore The S.S. = $\{(2, 1)\}$

5

- [a] $\therefore n(x) = \frac{x^2}{x-1} - \frac{x}{x-1}$
 \therefore The domain of $n = \mathbb{R} - \{1\}$, $n(x) = \frac{x(x-1)}{x-1}$
 $\therefore n(x) = x$
 [b] $\therefore n_1(x) = \frac{(x+3)(x-2)}{(x+2)(x-2)}$
 \therefore The domain of $n_1 = \mathbb{R} - \{-2, 2\}$ (1)
 $\therefore n_1(x) = \frac{x+3}{x+2}$
 $\therefore n_2(x) = \frac{(x+3)(x-3)}{(x-3)(x+2)}$
 \therefore The domain of $n_2 = \mathbb{R} - \{3, -2\}$ (2)
 $\therefore n_2(x) = \frac{x+3}{x+2}$
 From (1) and (2): $\therefore n_1 \neq n_2$
 Because the domain of $n_1 \neq$ the domain of n_2

3

Alexandria

1

- 1 b 2 d 3 b 4 d 5 a 6 a

2

- [a] $\therefore x - y = 0 \quad \therefore x = y$ (1)
 $\therefore x^2 + xy + y^2 = 27$ (2)
 Substituting from (1) in (2): $\therefore y^2 + y^2 + y^2 = 27$

- $\therefore 3y^2 = 27 \quad \therefore y^2 = 9$
 $\therefore y = 3$ or $y = -3$
 Substituting in (1): $\therefore x = 3$ or $x = -3$
 \therefore The S.S. = $\{(3, 3), (-3, -3)\}$

- [b] $\therefore n_1(x) = \frac{(x-3)(x+4)}{(x+1)(x+4)}$
 \therefore The domain of $n_1 = \mathbb{R} - \{-1, -4\}$
 $\therefore n_1(x) = \frac{x-3}{x+1}$
 $\therefore n_2(x) = \frac{(x-3)(x+1)}{(x+1)(x+1)}$
 \therefore The domain of $n_2 = \mathbb{R} - \{-1\}$, $n_2(x) = \frac{x-3}{x+1}$
 $\therefore n_1(x) = n_2(x)$ for all values
 of $x \in \mathbb{R} - \{-1, -4\}$

3

- [a] $\therefore 2x^2 + 5x = 0 \quad \therefore a = 2, b = 5, c = 0$
 $\therefore x = \frac{-5 \pm \sqrt{(5)^2 - 4 \times 2 \times 0}}{2 \times 2} = \frac{-5 \pm 5}{4}$
 $\therefore x = 0$ or $x = -2.5$
 \therefore The S.S. = $\{0, -2.5\}$
 [b] $\therefore n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \times \frac{x+3}{x^2+x+1}$
 \therefore The domain of $n = \mathbb{R} - \{0, 1\}$, $n(x) = \frac{x+3}{x}$

4

- [a] $\therefore 2x + y = 1 \quad \therefore y = 1 - 2x$ (1)
 $\therefore x + 2y = 5$ (2)
 Substituting from (1) in (2):
 $\therefore x + 2(1 - 2x) = 5 \quad \therefore x + 2 - 4x = 5$
 $\therefore -3x = 3 \quad \therefore x = -1$
 Substituting in (1): $\therefore y = 3$
 \therefore The S.S. = $\{(-1, 3)\}$
 [b] $\therefore n(x) = \frac{x(x-1)}{(x-1)(x+1)} + \frac{x+5}{(x+1)(x+5)}$
 \therefore The domain of $n = \mathbb{R} - \{1, -1, -5\}$
 $\therefore n(x) = \frac{x}{x+1} + \frac{1}{x+1} = \frac{x+1}{x+1} = 1$

5

- [a] 1 $\therefore n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$
 $\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$
 \therefore The domain of $n^{-1} = \mathbb{R} - \{0, 2\}$
 $\therefore n^{-1}(x) = \frac{x^2+2}{x}$

$$\begin{aligned} \text{[2]} \quad \therefore n^{-1}(X) &= 3 \quad \therefore \frac{X^2+2}{X} = 3 \\ \therefore X^2+2 &= 3X \quad \therefore X^2-3X+2=0 \\ \therefore (X-2)(X-1) &= 0 \\ \therefore X &= 2 \text{ (refused) or } X = 1 \end{aligned}$$

[b] A and B are mutually exclusive events

$$\begin{aligned} \therefore P(A \cup B) &= P(A) + P(B) \\ \therefore P(B) &= P(A \cup B) - P(A) = \frac{7}{12} - \frac{1}{3} = \frac{1}{4} \end{aligned}$$

4 El-Kalyoubia

1

1 b 2 d 3 c 4 a 5 c 6 c

2

$$\begin{aligned} \text{[a]} \quad \text{1} \quad P(A \cup B) &= P(A) + P(B) - P(A \cap B) \\ &= 0.8 + 0.7 - 0.6 = 0.9 \end{aligned}$$

$$\text{2} \quad P(\bar{A}) = 1 - P(A) = 1 - 0.8 = 0.2$$

[b] Let the length be X cm. and the width be y cm.

$$\therefore X - y = 4 \quad (1)$$

$$\therefore 2(X + y) = 28 \text{ (Dividing by 2)}$$

$$\therefore X + y = 14 \quad (2)$$

$$\text{Adding (1) and (2): } \therefore 2X = 18 \quad \therefore X = 9$$

$$\text{Substituting in (1): } \therefore y = 5$$

$$\therefore \text{The length} = 9 \text{ cm. } \therefore \text{the width} = 5 \text{ cm.}$$

$$\therefore \text{The area of the rectangle} = 9 \times 5 = 45 \text{ cm}^2$$

3

$$\text{[a]} \quad \therefore X - y = 0 \quad \therefore X = y \quad (1)$$

$$\therefore X^2 + Xy + y^2 = 27 \quad (2)$$

$$\text{Substituting from (1) in (2): } \therefore y^2 + y^2 + y^2 = 27$$

$$\therefore 3y^2 = 27 \quad \therefore y^2 = 9$$

$$\therefore y = 3 \text{ or } y = -3$$

$$\text{Substituting in (1): } \therefore X = 3 \text{ or } X = -3$$

$$\therefore \text{The S.S.} = \{(3, 3), (-3, -3)\}$$

$$\text{[b]} \quad \therefore n(X) = \frac{X(X+2)}{(X-3)(X^2+3X+9)} \div \frac{X+2}{X^2+3X+9}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{3, -2\}$$

$$\begin{aligned} \therefore n(X) &= \frac{X(X+2)}{(X-3)(X^2+3X+9)} \times \frac{X^2+3X+9}{X+2} \\ &= \frac{X}{X-3} \end{aligned}$$

4

$$\text{[a]} \quad \therefore 2X^2 - 4X + 1 = 0$$

$$\therefore a = 2, b = -4, c = 1$$

$$\therefore X = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2}$$

$$\therefore X \approx 1.7 \text{ or } X \approx 0.3 \quad \therefore \text{The S.S.} = \{1.7, 0.3\}$$

$$\text{[b]} \quad \therefore n_1(X) = \frac{2X}{2(X+2)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-2\} \quad (1)$$

$$\therefore n_1(X) = \frac{X}{X+2}$$

$$\therefore \therefore n_2(X) = \frac{X(X+2)}{(X+2)(X+2)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{-2\} \quad (2)$$

$$\therefore n_2(X) = \frac{X}{X+2}$$

$$\text{From (1) and (2): } \therefore n_1 = n_2$$

5

$$\text{[a]} \quad \therefore n(X) = \frac{X^2+2X+4}{(X-2)(X^2+2X+4)} + \frac{(X-3)(X+3)}{(X+3)(X-2)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -3\}$$

$$\therefore n(X) = \frac{1}{X-2} + \frac{X-3}{X-2} = \frac{X-2}{X-2} = 1$$

$$\text{[b]} \quad \therefore \text{The domain of } f = \mathbb{R} - \{2, k\}$$

$$\therefore \text{where } X = 2 \quad \therefore X^2 - 5X + m = 0$$

$$\therefore 4 - 5 \times 2 + m = 0 \quad \therefore m = 6$$

$$\therefore f(X) = \frac{X}{X^2 - 5X + 6}$$

$$\therefore f(X) = \frac{X}{(X-2)(X-3)}$$

$$\therefore \text{The domain of } f = \mathbb{R} - \{2, 3\} \quad \therefore k = 3$$

5 El-Sharkia

1

1 d 2 b 3 d 4 a 5 d 6 d

2

$$\text{[a]} \quad \therefore X(X-2) = 1 \quad \therefore X^2 - 2X - 1 = 0$$

$$\therefore a = 1, b = -2, c = -1$$

$$\therefore X = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1}$$

$$= \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2} = 1 \pm \sqrt{2}$$

$$\therefore X = 1 + \sqrt{2} \text{ or } X = 1 - \sqrt{2}$$

$$\therefore \text{The S.S.} = \{1 + \sqrt{2}, 1 - \sqrt{2}\}$$

Algebra and Probability

$$[b] \therefore n(x) = \frac{x(x^2+1)}{x^2+1} + \frac{x^2+2x+4}{(x-2)(x^2+2x+4)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2\}$$

$$\begin{aligned} n(x) &= x + \frac{1}{x-2} = \frac{x(x-2)+1}{x-2} \\ &= \frac{x^2-2x+1}{x-2} = \frac{(x-1)(x-1)}{x-2} \end{aligned}$$

3

$$[a] \therefore 2x - y = 3 \quad (1)$$

$$x + 2y = 4 \quad \therefore x = 4 - 2y \quad (2)$$

$$\text{Substituting from (2) in (1): } \therefore 2(4 - 2y) - y = 3$$

$$\therefore 8 - 4y - y = 3 \quad \therefore 8 - 5y = 3$$

$$\therefore -5y = -5 \quad \therefore y = 1$$

$$\text{Substituting in (2): } \therefore x = 2$$

$$\therefore \text{The S.S.} = \{(2, 1)\}$$

$$[b] \therefore n(x) = \frac{(x-5)(x+3)}{(x-3)(x+3)} + \frac{-2(x-5)}{(x-3)(x-3)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{3, -3, 5\}$$

$$n(x) = \frac{x-5}{x-3} \times \frac{(x-3)(x-3)}{-2(x-5)} = \frac{x-3}{-2}$$

4

$$[a] \therefore x + 2y = 2 \quad \therefore 2y = 2 - x \quad (1)$$

$$x^2 + 2xy = 2 \quad (2)$$

$$\text{Substituting from (1) in (2):}$$

$$\therefore x^2 + x(2-x) = 2 \quad \therefore x^2 + 2x - x^2 = 2$$

$$\therefore 2x = 2 \quad \therefore x = 1$$

$$\text{Substituting in (1): } \therefore y = \frac{1}{2}$$

$$\therefore \text{The S.S.} = \left\{ \left(1, \frac{1}{2} \right) \right\}$$

$$[b] \therefore n_1(x) = 1 - \frac{1}{x}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0\} \quad (1)$$

$$n_1(x) = \frac{x-1}{x}$$

$$\therefore n_2(x) = \frac{1-x}{x} \quad (2)$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0\}$$

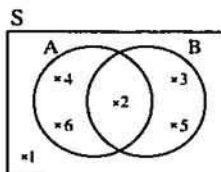
$$\text{From (1) and (2): } \therefore n_1 \neq n_2$$

5

$$[a] P(A) = \frac{3}{6} = \frac{1}{2}$$

$$P(B) = \frac{3}{6} = \frac{1}{2}$$

$$P(A \cup B) = \frac{5}{6}$$



$$[b] \therefore \text{The domain of } n = \mathbb{R} - \{0, 4\}$$

$$\therefore 4 + m = 0 \quad \therefore m = -4$$

$$\therefore n(5) = 2 \quad \therefore \frac{k}{5} + \frac{9}{5-4} = 2 \quad \therefore \frac{k}{5} + 9 = 2$$

$$\therefore \frac{k}{5} = -7 \quad \therefore k = -35$$

6

El-Monofia

1

$$1 \text{ d} \quad 2 \text{ b} \quad 3 \text{ c} \quad 4 \text{ d} \quad 5 \text{ c} \quad 6 \text{ a}$$

2

$$[a] \therefore 2x - y = 3 \quad (1)$$

$$x + 2y = 4 \quad \therefore x = 4 - 2y \quad (2)$$

$$\text{Substituting from (2) in (1): } \therefore 2(4 - 2y) - y = 3$$

$$\therefore 8 - 4y - y = 3 \quad \therefore 8 - 5y = 3$$

$$\therefore -5y = -5 \quad \therefore y = 1$$

$$\text{Substituting in (2): } \therefore x = 2$$

$$\therefore \text{The S.S.} = \{(2, 1)\}$$

$$[b] \therefore 3x^2 = 5x - 1 \quad \therefore 3x^2 - 5x + 1 = 0$$

$$\therefore a = 3, b = -5, c = 1$$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$$

$$\therefore x \approx 1.43 \text{ or } x \approx 0.23$$

$$\therefore \text{The S.S.} = \{1.43, 0.23\}$$

3

$$[a] \therefore z(f) = \{3\} \quad \therefore \text{At } x = 3$$

$$\therefore x^2 - ax + 9 = 0 \quad \therefore 3^2 - a \times 3 + 9 = 0$$

$$\therefore 9 - 3a + 9 = 0 \quad \therefore -3a = -18 \quad \therefore a = 6$$

$$\therefore \text{The domain of } f = \mathbb{R} - \{2\}$$

$$\therefore \text{At } x = 2 \quad \therefore bx + 4 = 0$$

$$\therefore 2b + 4 = 0 \quad \therefore 2b = -4 \quad \therefore b = -2$$

$$[b] \therefore n(x) = \frac{(x-2)(x^2+2x+4)}{(x-2)(x-1)} \div \frac{x(x^2+2x+4)}{(2x+3)(x-1)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, 1, 0, -\frac{3}{2}\}$$

$$n(x) = \frac{x^2+2x+4}{x-1} \times \frac{(2x+3)(x-1)}{x(x^2+2x+4)} = \frac{2x+3}{x}$$

4

$$[a] \therefore n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{3, 4, 0\}$$

$$n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$$

$$n(4) \text{ is undefined because } 4 \notin \text{the domain of } n$$

$$[b] \because x + y = 4 \quad \therefore y = 4 - x \quad (1)$$

$$\therefore \frac{1}{x} + \frac{1}{y} = 1 \quad \therefore y + x = xy \quad (2)$$

Substituting from (1) in (2) :

$$\therefore 4 - x + x = x(4 - x) \quad \therefore 4 = 4x - x^2$$

$$\therefore x^2 - 4x + 4 = 0 \quad \therefore (x - 2)(x - 2) = 0$$

$$\therefore x = 2$$

Substituting in (1) : $\therefore y = 2$

$$\therefore \text{The S.S.} = \{(2, 2)\}$$

5

$$[a] \because n_1 = \frac{(x+3)(x+2)}{(x+2)(x-1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-2, 1\} \quad (1)$$

$$\therefore n_1(x) = \frac{x+3}{x-1}$$

$$\therefore n_2(x) = \frac{(x-5)(x+3)}{(x-5)(x-1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{5, 1\} \quad (2)$$

$$\therefore n_2(x) = \frac{x+3}{x-1}$$

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_2 \neq$ the domain of n_1

$$[b] \quad 1 \because P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$\therefore P(A \cap B) = P(A) + P(B) - P(A \cup B) \\ = \frac{1}{4} + \frac{1}{2} - \frac{5}{8} = \frac{1}{8}$$

$$2 \because P(B - A) = P(B) - P(A \cap B) = \frac{1}{2} - \frac{1}{8} = \frac{3}{8}$$

$$3 \because P(A \cup B) = 1 - P(A \cap B) = 1 - \frac{1}{8} = \frac{7}{8}$$

7 El-Gharbia

1

$$1 \text{ c} \quad 2 \text{ d} \quad 3 \text{ b} \quad 4 \text{ d} \quad 5 \text{ c} \quad 6 \text{ d}$$

2

$$[a] \because P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$\therefore 0.8 = 0.5 + x - 0.1 \quad \therefore x = 0.4$$

$$\therefore P(A - B) = P(A) - P(A \cap B) = 0.5 - 0.1 = 0.4$$

$$[b] \because n(x) = \frac{x(x-2)+x}{x-2} = \frac{x^2-2x+x}{x-2} \\ = \frac{x^2-x}{x-2} = \frac{x(x-1)}{x-2}$$

$$\therefore n^{-1}(x) = \frac{x-2}{x(x-1)}$$

$$\therefore \text{the domain of } n^{-1} = \mathbb{R} - \{0, 1, 2\}$$

3

$$[a] \because n(x) = \frac{x}{x-2} - \frac{x}{x+2}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2\}$$

$$\therefore n(x) = \frac{x(x+2) - x(x-2)}{(x-2)(x+2)} \\ = \frac{x^2+2x-x^2+2x}{(x-2)(x+2)} = \frac{4x}{(x-2)(x+2)}$$

$$[b] \because x - y = 3 \quad \therefore x = y + 3 \quad (1)$$

$$\therefore y^2 - x y = 21 \quad (2)$$

Substituting from (1) in (2) : $\therefore y^2 - (y+3)y = 21$

$$\therefore y^2 - y^2 + 3y = 21$$

$$\therefore 3y = 21 \quad \therefore y = 7$$

Substituting in (1) : $\therefore x = 10$

$$\therefore \text{The S.S.} = \{(10, 7)\}$$

4

$$[a] \because x^2 + 2x - 4 = 0$$

$$\therefore a = 1, b = 2, c = -4$$

$$\therefore x = \frac{-2 \pm \sqrt{(2)^2 - 4 \times 1 \times (-4)}}{2 \times 1} \\ = \frac{-2 \pm \sqrt{20}}{2} = \frac{-2 \pm 2\sqrt{5}}{2} = -1 \pm \sqrt{5}$$

$$\therefore x = -1 + \sqrt{5} \text{ or } x = -1 - \sqrt{5}$$

$$\text{The S.S.} = \{-1 + \sqrt{5}, -1 - \sqrt{5}\}$$

$$[b] \because n_1(x) = \frac{(x-2)(x+2)}{(x+3)(x-2)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-3, 2\} \quad (1)$$

$$\therefore n_1(x) = \frac{x+2}{x+3}$$

$$\therefore n_2(x) = \frac{(x-3)(x+2)}{(x+3)(x-3)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{-3, 3\} \quad (2)$$

$$\therefore n_2(x) = \frac{x+2}{x+3}$$

From (1) and (2) : $\therefore n_1 \neq n_2$

because the domain of $n_1 \neq$ the domain of n_2

5

$$[a] \because n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \div \frac{x^2+x+1}{x+3}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{0, 1, -3\}$$

$$\therefore n(x) = \frac{(x-1)(x^2+x+1)}{x(x-1)} \times \frac{x+3}{x^2+x+1} = \frac{x+3}{x}$$

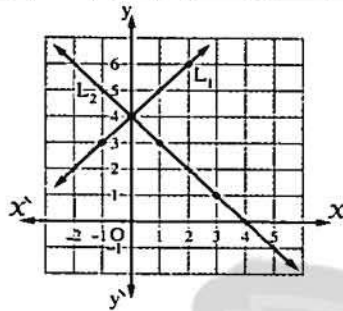
Algebra and Probability

[b] $y = x + 4$

$x = 4 - y$

x	-1	0	2
y	3	4	6

x	3	1	0
y	1	3	4

From the graph : \therefore The S.S. = $\{(0, 4)\}$

8 El-Dakahlia

1

[a] 1 b

[2] a

[3] a

[b] $\therefore 3x - y = 5$ (1)

$\therefore x + 2y = 4 \therefore x = 4 - 2y$ (2)

Substituting from (2) in (1) : $\therefore 3(4 - 2y) - y = 5$

$\therefore 12 - 6y - y = 5 \therefore -7y = -7$

$\therefore y = 1$

Substituting in (2) : $\therefore x = 2$

\therefore The S.S. = $\{(2, 1)\}$

2

[a] 1 a

[2] d

[3] d

[b] $\therefore n(x) = \frac{x(x+1)}{(x-1)(x+1)} + \frac{x-5}{(x-1)(x-5)}$

\therefore The domain of $n = \mathbb{R} - \{1, -1, 5\}$

$\therefore n(x) = \frac{x}{(x-1)} + \frac{1}{(x-1)} = \frac{x+1}{x-1}$

3

[a] $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$= 0.6 + 0.5 - 0.3 = 0.8$

$\therefore P(\bar{B}) = 1 - P(B) \therefore P(\bar{B}) = 1 - 0.5 = 0.5$

[b] $\therefore n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)^2} \times \frac{2(x-1)}{x^2+x+1}$

\therefore The domain of $n = \mathbb{R} - \{1\}$, $n(x) = 2$

4

[a] $\therefore n_1(x) = \frac{x(x-1)}{x^2(x-2)}$

\therefore The domain of $n_1 = \mathbb{R} - \{0, 2\}$ (1)

$\therefore n_1(x) = \frac{x-1}{x(x-2)}$

$\therefore n_2(x) = \frac{(x-2)(x-1)}{x(x-2)(x-2)}$

\therefore The domain of $n_2 = \mathbb{R} - \{0, 2\}$ (2)

$\therefore n_2(x) = \frac{x-1}{x(x-2)}$

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\therefore 2x^2 - 4x + 1 = 0$

$\therefore a = 2, b = -4, c = 1$

$\therefore x = \frac{4 \pm \sqrt{(-4)^2 - 4 \times 2 \times 1}}{2 \times 2}$

$= \frac{4 \pm \sqrt{8}}{4} = \frac{4 \pm 2\sqrt{2}}{4} = \frac{2 \pm \sqrt{2}}{2}$

$\therefore x \approx 1.71$ or $x \approx 0.29$

The S.S. = $\{1.71, 0.29\}$

5

[a] $\therefore x - y = 0 \therefore x = y$ (1)

$\therefore x = \frac{4}{y}$ (2)

Substituting from (1) in (2) : $\therefore x = \frac{4}{x}$

$\therefore x^2 = 4 \therefore x = \pm \sqrt{4}$

$\therefore x = 2$ or $x = -2$

Substituting in (1) : $\therefore y = 2$ or $y = -2$

\therefore The S.S. = $\{(2, 2), (-2, -2)\}$

[b] 1 $\therefore n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

\therefore the domain of $n^{-1} = \mathbb{R} - \{0, 2\}$

$\therefore n^{-1}(x) = \frac{x^2+2}{x}$

[2] $\therefore n^{-1}(x) = 3 \therefore \frac{x^2+2}{x} = 3$

$\therefore x^2 + 2 = 3x \therefore x^2 - 3x + 2 = 0$

$\therefore (x-2)(x-1) = 0$

$\therefore x = 2$ (refused) or $x = 1$

9 Ismailia

1

1 c 2 b 3 d 4 a 5 c 6 c

2

$$[a] \because 2x + y = 1 \quad \therefore y = 1 - 2x \quad (1)$$

$$, x + 2y = 5 \quad (2)$$

Substituting from (1) in (2):

$$\therefore x + 2(1 - 2x) = 5$$

$$\therefore x + 2 - 4x = 5 \quad \therefore -3x = 3$$

$$\therefore x = -1$$

Substituting in (1): $y = 3$ \therefore The S.S. = $\{(-1, 3)\}$

$$[b] \because n_1(x) = \frac{x^2 - 3x + 9}{(x+3)(x^2 - 3x + 9)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-3\}$$

$$, n_1(x) = \frac{1}{x+3} \quad (1)$$

$$, \because n_2(x) = \frac{2}{2(x+3)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{-3\}$$

$$, n_2(x) = \frac{1}{x+3} \quad (2)$$

From (1) and (2): $\therefore n_1 = n_2$

3

$$[a] \because 3x^2 - 6x + 1 = 0$$

$$\therefore a = 3, b = -6, c = 1$$

$$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{6 \pm \sqrt{24}}{6}$$

$$= \frac{6 \pm 2\sqrt{6}}{6} = \frac{3 \pm \sqrt{6}}{3}$$

$$\therefore x \approx 1.82 \text{ or } x \approx 0.18$$

The S.S. = $\{1.82, 0.18\}$

$$[b] \because \text{The domain of } n = \mathbb{R} - \{3\}$$

$$\therefore \text{At } x = 3 \quad \therefore x^2 - ax + 9 = 0$$

$$\therefore 9 - 3a + 9 = 0 \quad \therefore -3a = -18 \quad \therefore a = 6$$

4

$$[a] \text{ Let the two numbers be } x \text{ and } y$$

$$\therefore xy = 10 \quad (1)$$

$$, x - y = 3 \quad \therefore x = y + 3 \quad (2)$$

$$\text{Substituting from (2) in (1): } \therefore (y + 3)y = 10$$

$$\therefore y^2 + 3y - 10 = 0 \quad \therefore (y - 2)(y + 5) = 0$$

$$\therefore y = 2 \text{ or } y = -5$$

Substituting in (2): $x = 5$ or $x = -2$ \therefore The two numbers are: 5, 2 or -2, -5

$$[b] \because n(x) = \frac{(x+5)(x-1)}{(x-2)(x^2+2x+4)} \div \frac{x+5}{x^2+2x+4}$$

 \therefore The domain of $n = \mathbb{R} - \{2, -5\}$

$$, n(x) = \frac{(x+5)(x-1)}{(x-2)(x^2+2x+4)} \times \frac{x^2+2x+4}{x+5}$$

$$= \frac{x-1}{x-2}$$

$$, \therefore n(3) = \frac{3-1}{3-2} = 2$$

 $n(2)$ is undefined because 2 \notin the domain of n

5

$$[a] \because n(x) = \frac{x(x-3)}{(x-3)(x+3)} + \frac{x-1}{(x+3)(x-1)}$$

 \therefore The domain of $n = \mathbb{R} - \{3, -3, 1\}$

$$, n(x) = \frac{x}{x+3} + \frac{1}{x+3} = \frac{x+1}{x+3}$$

$$[b] \quad [1] P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.4 + 0.5 - 0.2 = 0.7$$

$$[2] P(A - B) = P(A) - P(A \cap B)$$

$$= 0.4 - 0.2 = 0.2$$

10 Suez

1

1 c 2 b 3 a 4 c 5 b 6 c

2

$$[a] \because x - y = 3 \quad \therefore x = y + 3 \quad (1)$$

$$, 2x + y = 9 \quad (2)$$

Substituting from (1) in (2): $\therefore 2(y + 3) + y = 9$

$$\therefore 2y + 6 + y = 9 \quad \therefore 3y = 3 \quad \therefore y = 1$$

Substituting in (1): $\therefore x = 4$ \therefore The S.S. = $\{(4, 1)\}$

$$[b] \because n(x) = \frac{x(x-2)}{(x-2)(x+2)} + \frac{2(x+3)}{(x+3)(x+2)}$$

 \therefore The domain of $n = \mathbb{R} - \{2, -2, -3\}$

$$, n(x) = \frac{x}{x+2} + \frac{2}{x+2} = \frac{x+2}{x+2} = 1$$

Algebra and Probability

3

[a] $X - y = 0 \quad \therefore X = y$

$\therefore xy = 9$

Substituting from (1) in (2) : $\therefore X^2 = 9$

$\therefore X = \pm\sqrt{9}$

$\therefore X = 3 \text{ or } X = -3$

Substituting in (1) : $\therefore y = 3 \text{ or } y = -3$

$\therefore \text{The S.S.} = \{(3, 3), (-3, -3)\}$

[b] $\therefore n(X) = \frac{(X+3)(X-1)}{X+3} \times \frac{X+1}{(X-1)(X+1)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{-3, 1, -1\}$

$\therefore n(X) = 1$

4

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.3 + 0.6 - 0.2 = 0.7$

2 $P(\bar{A}) = 1 - P(A) = 1 - 0.3 = 0.7$

[b] $\therefore n(X) = \frac{(X-1)(X-1)}{(X-1)(X^2+X+1)} \div \frac{X-1}{X^2+X+1}$

$\therefore \text{The domain of } n = \mathbb{R} - \{1\}$

$\therefore n(X) = \frac{X-1}{X^2+X+1} \times \frac{X^2+X+1}{X-1} = 1$

5

[a] $\therefore X^2 - 2X - 6 = 0$

$\therefore a = 1, b = -2, c = -6$

$\therefore X = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-6)}}{2 \times 1}$

$= \frac{2 \pm \sqrt{28}}{2} = \frac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$

$\therefore X \approx 3.65 \text{ or } X \approx -1.65$

$\therefore \text{The S.S.} = \{3.65, -1.65\}$

[b] $\therefore n_1(X) = \frac{2X}{2(X+2)}$

$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-2\}$

$\therefore n_1(X) = \frac{X}{X+2}$

$\therefore n_2(X) = \frac{X(X+2)}{(X+2)(X+2)}$

$\therefore \text{The domain of } n_2 = \mathbb{R} - \{-2\}$

$\therefore n_2(X) = \frac{X}{X+2}$

From (1) and (2) : $\therefore n_1 = n_2$

11

Port Said

1

1 b 2 c 3 b 4 d 5 d 6 a

2

[a] $\therefore \text{The domain of } n = \mathbb{R} - \{3\}$

$\therefore (3)^2 - 3a + 9 = 0 \quad \therefore 18 - 3a = 0$

$\therefore -3a = -18 \quad \therefore a = 6$

[b] Let the length be X cm. and the width be y cm.

$\therefore 2(X+y) = 22 \quad \therefore y = 11 - X$ (1)

$\therefore xy = 24$ (2)

Substituting from (1) in (2) : $\therefore X(11 - X) = 24$

$\therefore 11X - X^2 - 24 = 0$ (Multiplying by -1)

$\therefore X^2 - 11X + 24 = 0$

$(X-3)(X-8) = 0 \quad \therefore X = 3 \text{ or } X = 8$

Substituting in (1) : $\therefore y = 8 \text{ or } y = 3$

$\therefore \text{The length} = 8 \text{ cm. , the width} = 3 \text{ cm.}$

3

[a] $\therefore X^2 - 2X - 1 = 0$

$\therefore a = 1, b = -2, c = -1$

$\therefore X = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-1)}}{2 \times 1} = \frac{2 \pm \sqrt{8}}{2} = \frac{2 \pm 2\sqrt{2}}{2}$
 $= 1 \pm \sqrt{2}$

$\therefore X \approx 2.4 \text{ or } X \approx -0.4$

$\therefore \text{The S.S.} = \{2.4, -0.4\}$

[b] $\therefore n(X) = \frac{X^2+X+1}{X} \div \frac{(X-1)(X^2+X+1)}{X(X-1)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{0, 1\}$

$\therefore n(X) = \frac{X^2+X+1}{X} \times \frac{X}{X^2+X+1} = 1$

4

[a] $\therefore X + 3y = 7 \quad \therefore X = 7 - 3y$ (1)

$\therefore 5X - y = 3$ (2)

Substituting from (1) in (2) : $\therefore 5(7 - 3y) - y = 3$

$\therefore 35 - 15y - y = 3 \quad \therefore -16y = -32 \quad \therefore y = 2$

Substituting in (1) : $\therefore X = 1$

$\therefore \text{The S.S.} = \{(1, 2)\}$

[b] $\therefore n(X) = \frac{X(X+2)}{(X-2)(X+2)} + \frac{X-3}{(X-3)(X-2)}$

$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, 3\}$

$\therefore n(X) = \frac{X}{X-2} + \frac{1}{X-2} = \frac{X+1}{X-2}$

5

[a] 1 The probability that the number on the card is a multiple of 5 = $\frac{5}{20} = \frac{1}{4}$

2 The probability that the number on the card is a multiple of 5 = $\frac{4}{20} = \frac{1}{5}$

3 The probability that the number on the card is a multiple of 4 or 5 = $\frac{8}{20} = \frac{2}{5}$

[b] $\therefore n_1(x) = \frac{x+3}{(x-3)(x+3)}$

\therefore The domain of $n_1 = \mathbb{R} - \{3, -3\}$

$\therefore n_1(x) = \frac{1}{x-3}$

$\therefore n_2(x) = \frac{2}{2(x-3)}$

\therefore The domain of $n_2 = \mathbb{R} - \{3\}$

$\therefore n_2(x) = \frac{1}{x-3}$

$\therefore n_1(x) = n_2(x)$

for all the values of $x \in \mathbb{R} - \{3, -3\}$

12 Damietta

1

1 a 2 b 3 d 4 a 5 b 6 a

2

[a] $\therefore x + \frac{4}{x} = 6$

$\therefore x^2 + 4 = 6x \quad \therefore x^2 - 6x + 4 = 0$

$\therefore a = 1, b = -6, c = 4$

$\therefore x = \frac{6 \pm \sqrt{(-6)^2 - 4 \times 1 \times 4}}{2 \times 1} = \frac{6 \pm \sqrt{20}}{2} = \frac{6 \pm 2\sqrt{5}}{2}$
 $= 3 \pm \sqrt{5}$

$\therefore x \approx 5.2$ or $x \approx 0.8$

\therefore The S.S. = $\{5.2, 0.8\}$

[b] $\therefore n(x) = \frac{2x}{x-3} \div \frac{x(x+3)}{(x+3)(x-3)}$

\therefore The domain of $n = \mathbb{R} - \{3, -3, 0, -2\}$

$\therefore n(x) = \frac{2x}{x-3} \times \frac{(x+3)(x-3)}{x(x-2)} = \frac{2(x+3)}{x-2}$

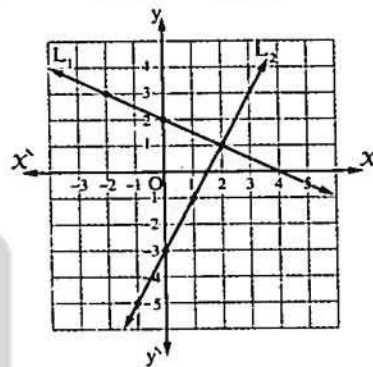
3

[a] $x = 4 - 2y$

$y = 2x - 3$

x	-2	0	2
y	3	2	1

x	1	0	-1
y	-1	-3	-5



From the graph : \therefore The S.S. = $\{(2, 1)\}$

[b] $\therefore n(x) = \frac{x^2 - 2x + 4}{(x+2)(x^2 - 2x + 4)} + \frac{(x-1)(x+1)}{(x+2)(x-1)}$

\therefore The domain of $n = \mathbb{R} - \{-2, 1\}$

$\therefore n(x) = \frac{1}{x+2} + \frac{x+1}{x+2} = \frac{x+2}{x+2} = 1$

4

[a] $\therefore n_1(x) = \frac{x(x+2)}{(x+2)(x+2)}$

\therefore The domain of $n_1 = \mathbb{R} - \{-2\}$ } (1)

$\therefore n_1(x) = \frac{x}{x+2}$

$\therefore n_2(x) = \frac{2x}{2(x+2)}$

\therefore The domain of $n_2 = \mathbb{R} - \{-2\}$ } (2)

$\therefore n_2(x) = \frac{x}{x+2}$

From (1) and (2) : $\therefore n_1 = n_2$

[b] $\therefore x - y = 2 \quad \therefore x = y + 2$ (1)

$\therefore x^2 + y^2 = 20$ (2)

Substituting from (1) in (2) : $\therefore (y+2)^2 + y^2 = 20$

$\therefore y^2 + 4y + 4 + y^2 = 20$

$\therefore 2y^2 + 4y - 16 = 0$ (Dividing by 2)

$\therefore y^2 + 2y - 8 = 0 \quad \therefore (y+4)(y-2) = 0$

$\therefore y = -4$ or $y = 2$

Substituting in (1) : $\therefore x = -2$ or $x = 4$

\therefore The S.S. = $\{(-2, -4), (4, 2)\}$

Algebra and Probability

5

[a] \therefore The domain of $n = \mathbb{R} - \{5\}$

$$\therefore (5)^2 - 5a + 25 = 0$$

$$\therefore -5a = -50 \quad \therefore a = 10$$

[b] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

$$= 0.8 + 0.7 - 0.6 = 0.9$$

2 $P(\bar{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

Kafr El-Sheikh

1

[a] 1 c 2 a 3 d

[b] $\therefore n(X) = \frac{(2X+3)(X-2)}{X(X-3)} \div \frac{(2X-3)(2X+3)}{X(2X-3)}$

$$\therefore \text{The domain of } n = \mathbb{R} - \left\{0, 3, \frac{3}{2}, \frac{-3}{2}\right\}$$

$$\therefore n(X) = \frac{(2X+3)(X-2)}{X(X-3)} \times \frac{X}{(2X+3)} = \frac{X-2}{X-3}$$

2

[a] 1 c 2 d 3 c

[b] $\therefore n_1(X) = \frac{X}{X(X-1)}$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\} \quad \left. \begin{array}{l} \therefore n_1(X) = \frac{1}{X-1} \end{array} \right\} (1)$$

$$\therefore n_2(X) = \frac{X(X^2+X+1)}{X(X-1)(X^2+X+1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, -1\} \quad \left. \begin{array}{l} \therefore n_2(X) = \frac{1}{X-1} \end{array} \right\} (2)$$

From (1) and (2) : $\therefore n_1 = n_2$

3

[a] $\therefore 3X^2 + 1 = 5X$

$$\therefore 3X^2 - 5X + 1 = 0$$

$$\therefore a = 3, b = -5, c = 1$$

$$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$$

$$\therefore X \approx 1.43 \text{ or } X \approx 0.23$$

$$\therefore \text{The S.S.} = \{1.43, 0.23\}$$

[b] 1 $\therefore z(n_2) = \{-3\} \therefore 6 - a(-3) = 0$

$$\therefore 6 + 3a = 0 \quad \therefore 3a = -6 \quad \therefore a = -2$$

2 $\therefore n(X) = n_1(X) - n_2(X)$

$$\therefore n(X) = \frac{X^2 - 2X - 15}{X^2 - 9} - \frac{2X + 6}{X^2 - 6X + 9}$$

$$= \frac{(X-5)(X+3)}{(X-3)(X+3)} - \frac{2(X+3)}{(X-3)(X-3)}$$

 \therefore The domain of $n = \mathbb{R} - \{3, -3\}$

$$\therefore n(X) = \frac{X-5}{X-3} - \frac{2(X+3)}{(X-3)(X-3)}$$

$$= \frac{(X-5)(X-3) - 2(X+3)}{(X-3)(X-3)}$$

$$= \frac{X^2 - 8X + 15 - 2X - 6}{(X-3)(X-3)}$$

$$= \frac{X^2 - 10X + 9}{(X-3)(X-3)} = \frac{(X-1)(X-9)}{(X-3)(X-3)}$$

4

[a] $\therefore 3X + 2y = 4$ (1)

$$\therefore X - 3y = 5 \quad \therefore X = 3y + 5$$
 (2)

Substituting from (2) in (1) :

$$\therefore 3(3y + 5) + 2y = 4$$

$$\therefore 9y + 15 + 2y = 4 \quad \therefore 11y = -11 \quad \therefore y = -1$$

Substituting in (2) : $\therefore X = 2$

$$\therefore \text{The S.S.} = \{(2, -1)\}$$

[b] $\therefore 2P(B) = P(\bar{B}) \therefore 2P(B) = 1 - P(B)$

$$\therefore 3P(B) = 1 \quad \therefore P(B) = \frac{1}{3}$$

$$1 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{1}{2} + \frac{1}{3} - \frac{1}{6} = \frac{2}{3}$$

2 $\therefore A, B$ are mutually exclusive events

$$\therefore P(A \cap B) = 0$$

$$\therefore P(A \cup B) = P(A) + P(B) = \frac{1}{2} + \frac{1}{3} = \frac{5}{6}$$

5

[a] $\therefore X - 2y - 1 = 0 \quad \therefore X = 2y + 1$ (1)

$$\therefore X^2 - Xy = 0$$
 (2)

Substituting from (1) in (2) :

$$\therefore (2y + 1)^2 - (2y + 1)y = 0$$

$$\therefore 4y^2 + 4y + 1 - 2y^2 - y = 0$$

$$\therefore 2y^2 + 3y + 1 = 0$$

$$\therefore (2y + 1)(y + 1) = 0 \quad \therefore y = -\frac{1}{2} \text{ or } y = -1$$

Substituting in (1) : $\therefore X = 0$ or $X = -1$

$$\therefore \text{The S.S.} = \left\{\left(0, -\frac{1}{2}\right), (-1, -1)\right\}$$

Answers of Final Examinations

[b] $\therefore n(x) = \frac{x(x-3)}{(x-3)(x^2+2)}$
 $\therefore n^{-1}(x) = \frac{(x-3)(x^2+2)}{x(x-3)}$
 \therefore The domain of $n^{-1} = \mathbb{R} - \{0, 3\}$
 $\therefore n^{-1}(x) = \frac{x^2+2}{x}$

14 El-Beheira

1

1 b 2 a 3 c 4 a 5 c 6 c

2

[a] $\therefore y - x = 2 \quad \therefore y = x + 2$ (1)

$\therefore x^2 + xy - 4 = 0$ (2)

Substituting from (1) in (2):

$\therefore x^2 + x(x+2) - 4 = 0$

$\therefore x^2 + x^2 + 2x - 4 = 0$

$\therefore 2x^2 + 2x - 4 = 0$ (Dividing by 2)

$\therefore x^2 + x - 2 = 0$

$(x-1)(x+2) = 0$

$\therefore x = 1$ or $x = -2$

Substituting in (1): $\therefore y = 3$ or $y = 0$

\therefore The S.S. = $\{(1, 3), (-2, 0)\}$

[b] $\therefore n(x) = \frac{(x-1)(x^2+x+1)}{(x-1)(x-1)} \times \frac{2(x-1)}{x^2+x+1}$

\therefore The domain of $n = \mathbb{R} - \{1\}$, $n(x) = 2$

3

[a] Let the measure of the first angle be x°

\therefore the measure of the second angle be y°

$\therefore x + y = 90^\circ$ (1)

$\therefore x - y = 50^\circ$ (2)

Adding (1) and (2): $\therefore 2x = 140^\circ \quad \therefore x = 70^\circ$

Substituting in (1): $\therefore y = 20^\circ$

\therefore The measures of the two angles are $70^\circ, 20^\circ$

[b] 1 $\therefore n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$

$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$

\therefore The domain of $n^{-1} = \mathbb{R} - \{0, 2\}$

$\therefore n^{-1}(x) = \frac{x^2+2}{x}$

2 $\therefore n^{-1}(x) = 3 \quad \therefore \frac{x^2+2}{x} = 3$

$\therefore x^2 - 3x + 2 = 0 \quad \therefore (x-2)(x-1) = 0$

$\therefore x = 2$ (refused) or $x = 1$

4

[a] $\therefore 3x^2 = 5x - 1 \quad \therefore 3x^2 - 5x + 1 = 0$

$\therefore a = 3, b = -5, c = 1$

$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$

$\therefore x \approx 1.43$ or $x \approx 0.23$

\therefore The S.S. = $\{1.43, 0.23\}$

[b] $\therefore n_1(x) = \frac{2x}{2(x+2)}$

\therefore The domain of $n_1 = \mathbb{R} - \{-2\}$ (1)

$\therefore n_1(x) = \frac{x}{x+2}$

$\therefore n_2(x) = \frac{x(x+2)}{(x+2)(x+2)}$

\therefore The domain of $n_2 = \mathbb{R} - \{-2\}$ (2)

$\therefore n_2(x) = \frac{x}{x+2}$

From (1) and (2): $\therefore n_1 = n_2$

5

[a] $\therefore n(x) = \frac{x-3}{(x-3)(x-4)} - \frac{4}{x(x-4)}$

\therefore The domain of $n = \mathbb{R} - \{3, 4, 0\}$

$\therefore n(x) = \frac{1}{x-4} - \frac{4}{x(x-4)} = \frac{x-4}{x(x-4)} = \frac{1}{x}$

[b] 1 $P(\bar{A}) = 1 - P(A) = 1 - 0.8 = 0.2$

2 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= 0.8 + 0.7 - 0.6 = 0.9$

15 El-Fayoum

1

1 b 2 b 3 d 4 b 5 a 6 c

2

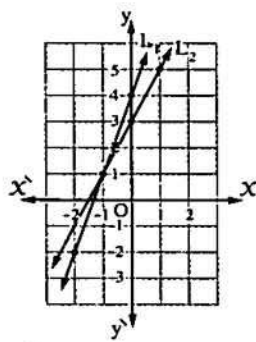
[a] $y = 3x + 4$

$y = 2x + 3$

x	-2	-1	0
y	-2	1	4

x	-1	0	1
y	1	3	5

Algebra and Probability



From the graph :

$$\therefore \text{The S.S.} = \{(-1, 1)\}$$

$$[b] \therefore n(x) = \frac{x(x-1)}{(x+1)(x-1)} + \frac{x-5}{(x-5)(x-1)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-1, 1, 5\}$$

$$\begin{aligned} \therefore n(x) &= \frac{x}{x+1} + \frac{1}{x-1} = \frac{x(x-1) + x+1}{(x+1)(x-1)} \\ &= \frac{x^2 - x + x + 1}{(x+1)(x-1)} \\ &= \frac{x^2 + 1}{(x+1)(x-1)} \end{aligned}$$

3

$$[a] \therefore x^2 + 3x + 5 = 0$$

$$\therefore a = 1, b = 3, c = 5$$

$$\therefore x = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times 5}}{2 \times 1} = \frac{-3 \pm \sqrt{-11}}{2}$$

$$\text{The S.S.} = \emptyset$$

$$[b] \therefore n(x) = \frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)} \div \frac{x+7}{x-2}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -7\}$$

$$\begin{aligned} \therefore n(x) &= \frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)} \times \frac{x-2}{x+7} \\ &= \frac{x-7}{x^2+2x+4} \end{aligned}$$

$$\therefore n(1) = \frac{1-7}{1+2+4} = \frac{-6}{7}$$

4

$$[a] \therefore n_1(x) = \frac{(x-2)(x+2)}{(x+3)(x-2)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-3, 2\}$$

$$\therefore n_1(x) = \frac{x+2}{x+3}$$

$$\therefore n_2(x) = \frac{x(x^2-x-6)}{x(x^2-9)} = \frac{x(x-3)(x+2)}{x(x-3)(x+3)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 3, -3\}$$

$$\therefore n_2(x) = \frac{x+2}{x+3}$$

$$\therefore n_1 \neq n_2$$

Because the domain of $n_1 \neq$ the domain of n_2

[b] Let x and y be two real numbers

$$\therefore x + y = 9 \quad \therefore y = 9 - x \quad (1)$$

$$\therefore x^2 - y^2 = 45 \quad (2)$$

$$\text{Substituting from (1) in (2) : } \therefore x^2 - (9 - x)^2 = 45$$

$$\therefore x^2 - (81 - 18x + x^2) = 45$$

$$\therefore x^2 - 81 + 18x - x^2 = 45$$

$$\therefore 18x = 126 \quad \therefore x = 7$$

$$\text{Substituting in (1) : } \therefore y = 2$$

$$\therefore \text{The two real numbers are : } 7, 2$$

5

$$[a] \therefore Z(f) = \{3, 5\}$$

$$\therefore \text{At } x = 3 \quad \therefore a \times 3^2 + 3 \times b + 15 = 0$$

$$\therefore 9a + 3b + 15 = 0 \quad \therefore 3a + b + 5 = 0 \quad (1)$$

$$\text{At } x = 5$$

$$\therefore a \times 5^2 + b \times 5 + 15 = 0$$

$$\therefore 25a + 5b + 15 = 0$$

$$\therefore 5a + b + 3 = 0 \quad (2)$$

Subtracting (1) from (2) :

$$\therefore 2a - 2 = 0 \quad \therefore a = 1$$

$$\text{Substituting in (1) : } \therefore 3 \times 1 + b + 5 = 0$$

$$\therefore 3 + b = -5 \quad \therefore b = -8$$

$$[b] \therefore P(A) = P(\bar{A}) \quad \therefore P(A) = 1 - P(A)$$

$$\therefore 2P(A) = 1 \quad \therefore P(A) = \frac{1}{2}$$

$$[1] \therefore P(B) = \frac{5}{8} P(A)$$

$$\therefore P(B) = \frac{5}{8} \times \frac{1}{2} = \frac{5}{16}$$

$$[2] P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{1}{2} + \frac{5}{16} - \frac{1}{16} = \frac{3}{4}$$

16 Beni Suef

1

$$[1] b \quad [2] c \quad [3] d \quad [4] a \quad [5] d \quad [6] c$$

2

$$[a] \therefore x^2 - 2x - 2 = 0$$

$$\therefore a = 1, b = -2, c = -2$$

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-2)}}{2 \times 1} = \frac{2 \pm \sqrt{12}}{2} = \frac{2 \pm 2\sqrt{3}}{2} = 1 \pm \sqrt{3}$$

$$\therefore \text{The S.S.} = \{1 + \sqrt{3}, 1 - \sqrt{3}\}$$

$$[b] \therefore n_1(x) = \frac{5x}{5(x+5)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-5\}$$

$$, n_1(x) = \frac{x}{x+5}$$

$$, \therefore n_2(x) = \frac{x(x+5)}{(x+5)^2}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{-5\}$$

$$, n_2(x) = \frac{x}{x+5}$$

$$\text{From (1) , (2) : } \therefore n_1 = n_2$$

3

$$[a] \therefore x + y = 7 \quad \therefore y = 7 - x \quad (1)$$

$$, x^2 + y^2 = 25 \quad (2)$$

Substituting from (1) in (2) :

$$\therefore x^2 + (7 - x)^2 = 25$$

$$\therefore x^2 + 49 - 14x + x^2 - 25 = 0$$

$$\therefore 2x^2 - 14x + 24 = 0 \quad (\text{Dividing by 2})$$

$$\therefore x^2 - 7x + 12 = 0 \quad \therefore (x-3)(x-4) = 0$$

$$\therefore x = 3 \text{ or } x = 4$$

$$\text{Substituting in (1) : } \therefore y = 4 \text{ or } y = 3$$

$$\therefore \text{The S.S.} = \{(3, 4), (4, 3)\}$$

$$[b] \therefore n(x) = \frac{x^2}{x(x-3)} \div \frac{3x}{(x+3)(x-3)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{0, 3, -3\}$$

$$, n(x) = \frac{x}{x-3} \times \frac{(x+3)(x-3)}{3x} = \frac{x+3}{3}$$

4

$$[a] P(\bar{A}) = 1 - P(A) = 1 - 0.7 = 0.3$$

$$P(A - B) = P(A) - P(A \cap B)$$

$$= 0.7 - 0.3 = 0.4$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.7 + 0.5 - 0.3 = 0.9$$

$$[b] \therefore Z(f) = \{5\} \quad \therefore \text{At } x = 5$$

$$\therefore x^2 - 10x + a = 0 \quad \therefore (5)^2 - 10 \times 5 + a = 0$$

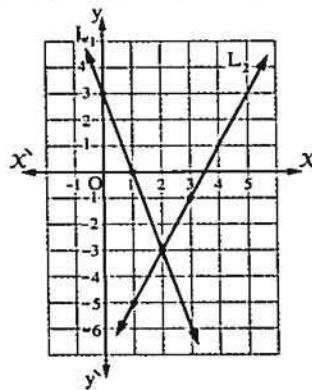
$$\therefore 25 - 50 + a = 0 \quad \therefore a = 25$$

5

$$[a] y = 3 - 3x \quad , \quad y = 2x - 7$$

x	0	1	2
y	3	0	-3

x	1	2	3
y	-5	-3	-1



From the graph :

$$\therefore \text{The S.S.} = \{(2, -3)\}$$

$$[b] \therefore n(x) = \frac{x^2 + x + 1}{(x-1)(x^2 + x + 1)} + \frac{(x-2)(x+1)}{(x-1)(x+1)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{1, -1\}$$

$$, n(x) = \frac{1}{x-1} + \frac{x-2}{x-1} = \frac{x-1}{x-1} = 1$$

17

El-Menia

1

$$1 \text{ a} \quad 2 \text{ c} \quad 3 \text{ d} \quad 4 \text{ a} \quad 5 \text{ b} \quad 6 \text{ a}$$

2

$$[a] \therefore 3x^2 - 5x + 1 = 0$$

$$\therefore a = 3, b = -5, c = 1$$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 3 \times 1}}{2 \times 3} = \frac{5 \pm \sqrt{13}}{6}$$

$$\therefore x \approx 1.4 \text{ or } x \approx 0.2$$

$$\therefore \text{The S.S.} = \{1.4, 0.2\}$$

$$[b] \therefore n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-3)(x-2)} \div \frac{x^2 + 2x + 4}{x-3}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{3, 2\}$$

$$, n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-3)(x-2)} \times \frac{x-3}{x^2 + 2x + 4} = 1$$

3

$$[a] \therefore 2x + y = 1 \quad (1)$$

$$, x + 2y = 5 \quad \therefore x = 5 - 2y \quad (2)$$

$$\text{Substituting from (2) in (1) : } \therefore 2(5 - 2y) + y = 1$$

Algebra and Probability

$$\therefore 10 - 4y + y = 1 \quad \therefore -3y = -9$$

$$\therefore y = 3$$

Substituting in (2): $\therefore x = -1$

$$\therefore \text{The S.S.} = \{(-1, 3)\}$$

$$[b] \therefore n(x) = \frac{(x-5)(x+3)}{(x-3)(x+3)} - \frac{2(5-x)}{(x-5)(x-3)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{3, -3, 5\}$$

$$\therefore n(x) = \frac{x-5}{x-3} + \frac{2(x-5)}{(x-5)(x-3)} = \frac{x-5}{x-3} + \frac{2}{x-3} \\ = \frac{x-3}{x-3} = 1$$

4

$$[a] \therefore x + y = 2 \quad (1)$$

$$\therefore \frac{1}{x} + \frac{1}{y} = 2 \quad \therefore x + y = 2xy \quad (2)$$

Substituting in (1) from (2): $\therefore 2 = 2xy$

$$\therefore xy = 1 \quad \therefore x = \frac{1}{y}$$

$$\text{Substituting in (1): } \frac{1}{y} + y = 2$$

$$\text{Multiplying by } y: \therefore 1 + y^2 = 2y$$

$$\therefore y^2 - 2y + 1 = 0 \quad \therefore (y-1)^2 = 0$$

$$\therefore y = 1$$

$$\text{Substituting in (1): } \therefore x = 1$$

$$\therefore \text{The S.S.} = \{(1, 1)\}$$

$$[b] \therefore n_1(x) = \frac{x^2}{x^2(x-1)} \\ \therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\} \quad (1) \\ \therefore n_1(x) = \frac{1}{x-1}$$

$$\therefore n_2(x) = \frac{x(x^2+x+1)}{x(x^3-1)} \\ = \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\} \quad (2) \\ \therefore n_2(x) = \frac{1}{x-1}$$

$$\text{From (1) and (2): } \therefore n_1 = n_2$$

5

$$[a] \therefore n(x) = \frac{x(x-2)}{(x-2)(x^2+2)}$$

$$\therefore n^{-1}(x) = \frac{(x-2)(x^2+2)}{x(x-2)}$$

$$\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 2\}$$

$$\therefore n^{-1}(x) = \frac{x^2+2}{x}$$

$$[b] \quad 1 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.3 + 0.6 - 0.2 = 0.7$$

$$2 \quad P(A - B) = P(A) - P(A \cap B)$$

$$= 0.3 - 0.2 = 0.1$$

18 Assiut

1

$$1 \quad b \quad 2 \quad c \quad 3 \quad d \quad 4 \quad c \quad 5 \quad d \quad 6 \quad a$$

2

$$[a] \therefore 3x - y + 4 = 0 \quad (1)$$

$$\therefore y = 2x + 3 \quad (2)$$

Substituting from (2) in (1):

$$\therefore 3x - (2x + 3) + 4 = 0$$

$$\therefore 3x - 2x - 3 + 4 = 0 \quad \therefore x = -1$$

$$\text{Substituting in (2): } \therefore y = 1$$

$$\therefore \text{The S.S.} = \{(-1, 1)\}$$

$$[b] \therefore n(x) = \frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)} \div \frac{x+7}{x-2}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -7\}$$

$$\therefore n(x) = \frac{(x-7)(x+7)}{(x-2)(x^2+2x+4)} \times \frac{x-2}{x+7} \\ = \frac{x-7}{x^2+2x+4}$$

$$\therefore n(1) = \frac{1-7}{1+2+4} = -\frac{6}{7}$$

3

$$[a] \therefore x(x-1) = 5 \quad \therefore x^2 - x - 5 = 0$$

$$\therefore a = 1, b = -1, c = -5$$

$$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-5)}}{2 \times 1} = \frac{1 \pm \sqrt{21}}{2}$$

$$\therefore x \approx 2.8 \text{ or } x \approx -1.8$$

$$\therefore \text{The S.S.} = \{2.8, -1.8\}$$

$$[b] \therefore n_1(x) = \frac{(x-2)(x+2)}{(x+3)(x-2)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-3, 2\}, n_1(x) = \frac{x+2}{x+3}$$

$$\therefore n_2(x) = \frac{x(x^2-x-6)}{x(x^2-9)} = \frac{x(x-3)(x+2)}{x(x-3)(x+3)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 3, -3\}$$

$$\therefore n_2(x) = \frac{x+2}{x+3}$$

$$\therefore n_1(x) = n_2(x) \text{ for all values} \\ \text{of } x \in \mathbb{R} - \{0, 3, -3, 2\}$$

Answers of Final Examinations

4

$$[a] \because X - y = 2 \quad \therefore X = y + 2 \quad (1)$$

$$, X^2 + y^2 = 20 \quad (2)$$

Substituting from (1) in (2):

$$\therefore (y + 2)^2 + y^2 = 20$$

$$\therefore y^2 + 4y + 4 + y^2 - 20 = 0$$

$$\therefore 2y^2 + 4y - 16 = 0 \quad (\text{Dividing by 2})$$

$$\therefore y^2 + 2y - 8 = 0$$

$$\therefore (y + 4)(y - 2) = 0$$

$$\therefore y = -4 \text{ or } y = 2$$

Substituting in (1):

$$\therefore X = -2 \text{ or } X = 4$$

$$\therefore \text{The S.S.} = \{(-2, -4), (4, 2)\}$$

$$[b] \because Z(f) = \{5\}$$

$$\therefore (5)^3 - 3(5)^2 + a = 0 \quad \therefore 125 - 75 + a = 0$$

$$50 + a = 0 \quad \therefore a = -50$$

5

$$[a] \because n(X) = \frac{X-3}{(X-4)(X-3)} + \frac{X-3}{X-3}$$

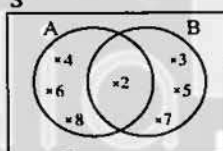
$$\therefore \text{The domain of } n = \mathbb{R} - \{4, 3\}$$

$$, n(X) = \frac{1}{X-4} + 1 = \frac{1+X-4}{X-4} = \frac{X-3}{X-4}$$

$$[b] \quad 1) P(A) = \frac{4}{7}$$

$$, P(B) = 1 - P(A)$$

$$= 1 - \frac{4}{7} = \frac{3}{7}$$



$$2) P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= \frac{4}{7} + \frac{3}{7} - \frac{1}{7} = 1$$

19 Souhag

1

$$1) d \quad 2) c \quad 3) b \quad 4) a \quad 5) d \quad 6) c$$

2

$$[a] \because X(X-1) = 4 \quad \therefore X^2 - X - 4 = 0$$

$$\therefore a = 1, b = -1, c = -4$$

$$\therefore X = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$$

$$X = 2.6 \text{ or } X = -1.6$$

$$\therefore \text{The S.S.} = \{2.6, -1.6\}$$

$$[b] \because n_1(X) = \frac{X^2}{X^2(X-1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\} \quad (1)$$

$$, n_1(X) = \frac{1}{X-1}$$

$$, \therefore n_2(X) = \frac{X(X^2 + X + 1)}{X(X^3 - 1)}$$

$$= \frac{X(X^2 + X + 1)}{X(X-1)(X^2 + X + 1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\} \quad (2)$$

$$, n_2(X) = \frac{1}{X-1}$$

$$\text{from (1) and (2): } \therefore n_1 = n_2$$

3

$$[a] \because X - y = 0 \quad \therefore X = y \quad (1)$$

$$, X^2 + Xy + y^2 = 27 \quad (2)$$

Substituting from (1) in (2):

$$\therefore y^2 + y^2 + y^2 = 27 \quad \therefore 3y^2 = 27$$

$$\therefore y^2 = 9 \quad \therefore y = 3 \text{ or } y = -3$$

Substituting in (1): $\therefore X = 3 \text{ or } X = -3$

$$\therefore \text{The S.S.} = \{(3, 3), (-3, -3)\}$$

$$[b] \because n(X) = \frac{X(X-2)}{(X-2)(X-1)}$$

$$\therefore n^{-1}(X) = \frac{(X-2)(X-1)}{X(X-2)}$$

$$\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 2, 1\}$$

$$, n^{-1}(X) = \frac{X-1}{X}$$

4

$$[a] \because 2X - y = 5 \quad (1)$$

$$, X + y = 4 \quad (2)$$

Adding (1) and (2): $\therefore 3X = 9 \quad \therefore X = 3$ Substituting in (2): $\therefore y = 1$

$$[b] \because n(X) = \frac{X(X+2)}{(X+2)(X-2)} - \frac{2(X-3)}{(X-3)(X-2)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-2, 2, 3\}$$

$$\therefore n(X) = \frac{X}{X-2} - \frac{2}{X-2} = \frac{X-2}{X-2} = 1$$

5

$$[a] \because n(X) = \frac{(X-2)(X^2 + 2X + 4)}{(X-2)(X+3)} \times \frac{X+3}{X^2 + 2X + 4}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -3\}, n(X) = 1$$

Algebra and Probability

$$[b] P(\bar{A}) = 1 - P(A) = 1 - 0.3 = 0.7$$

$$P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ = 0.3 + 0.6 - 0.2 = 0.7$$

20 Qena

1

1 d 2 c 3 a 4 b 5 c 6 a

2

$$[a] \because x - 2 = 0 \quad \therefore x = 2 \quad (1)$$

$$y^2 - 3xy + 5 = 0 \quad (2)$$

Substituting from (1) in (2): $\therefore y^2 - 6y - 5 = 0$

$$\therefore (y - 5)(y - 1) = 0$$

$$\therefore y = 5 \text{ or } y = 1$$

$$\therefore \text{The S.S.} = \{(2, 5), (2, 1)\}$$

$$[b] \because n(x) = \frac{5}{x-3} - \frac{4}{x-3}$$

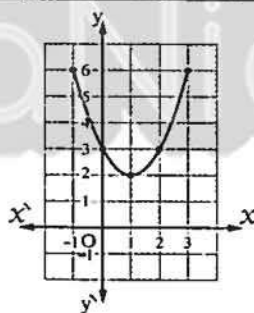
$$\therefore \text{The domain of } n = \mathbb{R} - \{3\}$$

$$n(x) = \frac{5-4}{x-3} = \frac{1}{x-3}$$

3

$$[a] f(x) = x^2 - 2x + 3$$

x	-1	0	1	2	3
y	6	3	2	3	6

From the graph: $\therefore \text{The S.S.} = \emptyset$

$$[b] \because n(x) = \frac{(x+4)(x-3)}{(x+4)(x+1)}$$

$$\therefore n^{-1}(x) = \frac{(x+4)(x+1)}{(x+4)(x-3)}$$

$$\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{-4, 3, -1\}$$

$$n^{-1}(x) = \frac{x+1}{x-3} \quad \therefore n^{-1}(0) = \frac{0+1}{0-3} = -\frac{1}{3}$$

4

$$[a] \because 2x^2 - 5x + 1 = 0$$

$$\therefore a = 2, b = -5, c = 1$$

$$\therefore x = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$$

$$\therefore x \approx 2.28 \text{ or } x \approx 0.22$$

$$\therefore \text{The S.S.} = \{2.28, 0.22\}$$

$$[b] \because n_1(x) = \frac{(x+1)(x^2-x+1)}{x(x^2-x+1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0\} \quad \left. \begin{array}{l} \therefore n_1(x) = \frac{x+1}{x} \end{array} \right\} (1)$$

$$\therefore n_2(x) = \frac{x^2(x+1) + x + 1}{x(x^2+1)} = \frac{(x+1)(x^2+1)}{x(x^2+1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0\} \quad \left. \begin{array}{l} \therefore n_2(x) = \frac{x+1}{x} \end{array} \right\} (2)$$

$$\text{from (1) and (2): } \therefore n_1 = n_2$$

5

$$[a] 1 P(\bar{A}) = 1 - P(A) = 1 - 0.8 = 0.2$$

$$2 P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ = 0.8 + 0.7 - 0.6 = 0.9$$

$$3 P(A - B) = P(A) - P(A \cap B) \\ = 0.8 - 0.6 = 0.2$$

$$[b] \because n(x) = \frac{x(x+2)}{(x-3)(x^2+3x+9)} \div \frac{x+2}{x^2+3x+9}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{3, -2\}$$

$$\therefore n(x) = \frac{x(x+2)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+2} \\ = \frac{x}{x-3}$$

21 Luxor

1

1 d 2 b 3 c 4 b 5 d 6 a

2

$$[a] \text{ Let } n_1(x) = \frac{x-4}{x^2-5x+6}$$

$$\therefore n_1(x) = \frac{x-4}{(x-2)(x-3)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{2, 3\}$$

$$\therefore \text{let } n_2(x) = \frac{2x}{x^3-9x}$$

$$\therefore n_2(x) = \frac{2x}{x(x^2-9)} = \frac{2x}{x(x-3)(x+3)}$$

∴ The domain of $n_2 = \mathbb{R} - \{0, 3, -3\}$

∴ The common domain $= \mathbb{R} - \{2, 3, 0, -3\}$

[b] ∴ $y + 2x = 7$ ∴ $y = 7 - 2x$ (1)

$2x^2 + x + 3y = 19$ (2)

Substituting from (1) in (2):

∴ $2x^2 + x + 3(7 - 2x) = 19$

∴ $2x^2 + x + 21 - 6x = 19$

∴ $2x^2 - 5x + 2 = 0$ ∴ $(2x - 1)(x - 2) = 0$

∴ $x = \frac{1}{2}$ or $x = 2$

Substituting (1): ∴ $y = 6$ or $y = 3$

∴ The S.S. $= \left\{ \left(\frac{1}{2}, 6 \right), (2, 3) \right\}$

3

[a] ∴ $n(x) = \frac{x-3}{(x-3)(x-4)} + \frac{x-3}{x-3}$

∴ The domain of $n = \mathbb{R} - \{3, 4\}$

∴ $n(x) = \frac{1}{x-4} + 1 = \frac{1}{x-4} + \frac{x-4}{x-4} = \frac{x-3}{x-4}$

[b] 1 The probability of the student succeeded in Math $= \frac{30}{40} = \frac{3}{4}$

2 The probability of the student succeeded in Science only $= \frac{4}{40} = \frac{1}{10}$

3 The probability of the succeeded in one of them at least $= \frac{34}{40} = \frac{17}{20}$

4

[a] ∴ $2x^2 - x - 2 = 0$

∴ $a = 2, b = -1, c = -2$

∴ $x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 2 \times (-2)}}{2 \times 2}$

$= \frac{1 \pm \sqrt{17}}{4} = \frac{1 \pm 4.12}{4}$

∴ $x = 1.28$ or $x = -0.78$

∴ The S.S. $= \{1.28, -0.78\}$

[b] ∴ $n_1(x) = \frac{x}{(x-1)(x+1)}$

∴ The domain of $n_1 = \mathbb{R} - \{1, -1\}$ } (1)

∴ $n_1(x) = \frac{x}{(x-1)(x+1)}$

∴ $n_2(x) = \frac{5x}{5(x^2-1)} = \frac{5x}{5(x-1)(x+1)}$ } (2)

∴ $n_2(x) = \frac{x}{(x-1)(x+1)}$

from (1) and (2): ∴ $n_1 = n_2$

5

[a] ∴ $n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \div \frac{x(2x-3)}{(2x-3)(2x+3)}$

∴ The domain of $n = \mathbb{R} - \left\{ -\frac{3}{2}, 2, 0, \frac{3}{2} \right\}$

∴ $n(x) = \frac{x(x-3)}{(2x+3)(x-2)} \times \frac{(2x-3)(2x+3)}{x(2x-3)}$
 $= \frac{x-3}{x-2}$

[b] ∴ $x + 2y = 8$ (1)

$3x + y = 9$ (multiplying by -2)

∴ $-6x - 2y = -18$ (2)

Adding (1) and (2): $-5x = -10$

∴ $x = 2$

Substituting in (1): ∴ $y = 3$

∴ The S.S. $= \{(2, 3)\}$

22

Aswan

1

1 c 2 b 3 d 4 c 5 d 6 c

2

[a] ∴ $3x - y = -4$ (1)

$y - 2x = 3$ ∴ $y = 3 + 2x$ (2)

Substituting from (2) in (1):

∴ $3x - (3 + 2x) = -4$

∴ $3x - 3 - 2x = -4$

∴ $x = -1$

Substituting in (2): ∴ $y = 1$

∴ The S.S. $= \{-1, 1\}$

[b] ∴ $n(x) = \frac{(x+1)(x+3)}{(x-3)(x^2+3x+9)} \div \frac{x+3}{x^2+3x+9}$

∴ The domain of $n = \mathbb{R} - \{3, -3\}$

∴ $n(x) = \frac{(x+1)(x+3)}{(x-3)(x^2+3x+9)} \times \frac{x^2+3x+9}{x+3}$
 $= \frac{x+1}{x-3}$

3

[a] ∴ $x - y = 1$ ∴ $x = y + 1$ (1)

$x^2 + y^2 = 25$ (2)

Substituting from (1) in (2): ∴ $(y+1)^2 + y^2 = 25$

∴ $y^2 + 2y + 1 + y^2 - 25 = 0$

Algebra and Probability

$$\therefore 2y^2 + 2y - 24 = 0 \text{ (Dividing by 2)}$$

$$\therefore y^2 + y - 12 = 0 \quad \therefore (y-3)(y+4) = 0$$

$$\therefore y = 3 \text{ or } y = 4$$

$$\text{Substituting in (1): } \therefore X = 4 \text{ or } X = 5$$

$$\therefore \text{The S.S.} = \{(4, 3), (5, 4)\}$$

$$[b] \therefore n(X) = \frac{X(X-2)}{(X-2)(X-1)}$$

$$\therefore n^{-1}(X) = \frac{(X-2)(X-1)}{X(X-2)}$$

$$\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 2, 1\}$$

$$\therefore n^{-1}(X) = \frac{X-1}{X}$$

4

$$[a] \therefore 2X^2 - 5X + 1 = 0$$

$$\therefore a = 2, b = -5, c = 1$$

$$\therefore X = \frac{5 \pm \sqrt{(-5)^2 - 4 \times 2 \times 1}}{2 \times 2} = \frac{5 \pm \sqrt{17}}{4}$$

$$\therefore \text{The S.S.} = \left\{ \frac{5 + \sqrt{17}}{4}, \frac{5 - \sqrt{17}}{4} \right\}$$

$$[b] \therefore n(X) = \frac{X(X+2)}{(X+2)(X-2)} - \frac{2(X-3)}{(X-2)(X-3)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-2, 2, 3\}$$

$$\therefore n(X) = \frac{X}{X-2} - \frac{2}{X-2} = \frac{X-2}{X-2} = 1$$

5

$$[a] \therefore n_1(X) = \frac{2X}{2(X+4)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{-4\} \quad \left. \begin{array}{l} \therefore n_1(X) = \frac{X}{X+4} \end{array} \right\} (1)$$

$$\therefore n_2(X) = \frac{X(X+4)}{(X+4)(X+4)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{-4\} \quad \left. \begin{array}{l} \therefore n_2(X) = \frac{X}{X+4} \end{array} \right\} (2)$$

$$\text{from (1) and (2): } \therefore n_1 = n_2$$

$$[b] \therefore A, B \text{ are two mutually exclusive events}$$

$$\therefore P(A \cup B) = P(A) + P(B)$$

$$\therefore \frac{7}{12} = \frac{1}{3} + P(B)$$

$$\therefore P(B) = \frac{7}{12} - \frac{1}{3} = \frac{7-4}{12} = \frac{3}{12} = \frac{1}{4}$$

23 New Valley

1

$$1 \text{ b} \quad 2 \text{ a} \quad 3 \text{ a} \quad 4 \text{ d} \quad 5 \text{ c} \quad 6 \text{ d}$$

2

$$[a] \therefore n(X) = \frac{(X-2)(X+2)}{(X+2)(X+3)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-2, -3\}$$

$$\therefore n(X) = \frac{X-2}{X+3}$$

$$[b] \therefore X^2 + y^2 = 17 \quad (1)$$

$$\therefore y - X = 3 \quad \therefore y = X + 3 \quad (2)$$

$$\text{Substituting from (2) in (1): } \therefore X^2 + (X+3)^2 = 17$$

$$\therefore X^2 + X^2 + 6X + 9 = 17$$

$$\therefore 2X^2 + 6X - 8 = 0 \text{ (Dividing by 2)}$$

$$\therefore X^2 + 3X - 4 = 0 \quad \therefore (X+4)(X-1) = 0$$

$$\therefore X = -4 \text{ or } X = 1$$

$$\text{Substituting in (2): } \therefore y = -1 \text{ or } y = 4$$

$$\therefore \text{The S.S.} = \{(-4, -1), (1, 4)\}$$

3

$$[a] \therefore 3X - 2y = 4 \quad (1)$$

$$\therefore X + 3y = 5 \quad \therefore X = 5 - 3y \quad (2)$$

$$\text{Substituting from (2) in (1): } \therefore 3(5 - 3y) - 2y = 4$$

$$\therefore 15 - 9y - 2y = 4 \quad \therefore -11y = -11 \quad \therefore y = 1$$

$$\text{Substituting in (2): } X = 2$$

$$\therefore \text{The S.S.} = \{(2, 1)\}$$

$$[b] \therefore n(X) = \frac{X}{X+2} \div \frac{2X^2 - 4X}{X^2 - 4}$$

$$= \frac{X}{X+2} \div \frac{2X(X-2)}{(X-2)(X+2)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, 0\}$$

$$\therefore n(X) = \frac{X}{X+2} \times \frac{(X-2)(X+2)}{2X(X-2)} = \frac{1}{2}$$

4

$$[a] \therefore n_1(X) = \frac{(X-1)(X^2 + X + 1)}{X(X^2 + X + 1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0\} \quad \left. \begin{array}{l} \therefore n_1(X) = \frac{X-1}{X} \end{array} \right\} (1)$$

$$\therefore n_2(X) = \frac{X^2(X-1) + (X-1)}{X(X^2 + 1)} = \frac{(X-1)(X^2 + 1)}{X(X^2 + 1)}$$

Answers of Final Examinations

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0\} \left. \vphantom{\begin{array}{l} \text{The domain of } n_2 \\ n_2(X) = \frac{X-1}{X} \end{array}} \right\} (2)$$

$$n_2(X) = \frac{X-1}{X}$$

$$\text{from (1) and (2)} : \therefore n_1 = n_2$$

$$[b] \therefore n(X) = \frac{3X}{X(X-3)} - \frac{X}{X-3}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{0, 3\}$$

$$n(X) = \frac{3}{X-3} - \frac{X}{X-3} = \frac{3-X}{X-3} = \frac{-(X-3)}{(X-3)} = -1$$

5

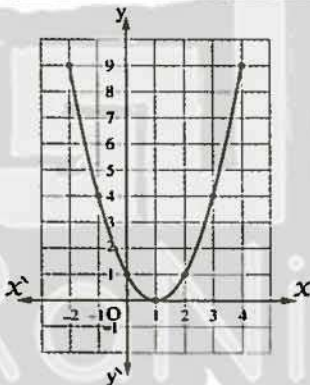
$$[a] \text{ 1 } P(A) = 1 - P(A) = 1 - \frac{1}{5} = \frac{4}{5}$$

$$\text{2 } P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ = \frac{1}{5} + \frac{3}{5} - \frac{1}{10} = \frac{7}{10}$$

$$\text{3 } P(B - A) = P(B) - P(A \cap B) \\ = \frac{3}{5} - \frac{1}{10} = \frac{5}{10} = \frac{1}{2}$$

$$[b] f(X) = X^2 - 2X + 1$$

X	-2	-1	0	1	2	3	4
y	9	4	1	0	1	4	9



From the graph : \therefore The S.S. = $\{1\}$

24 South Sinai

1

$$\text{1 a } \quad \text{2 b } \quad \text{3 c } \quad \text{4 d } \quad \text{5 b } \quad \text{6 b}$$

2

$$[a] \therefore X^2 - 2X - 6 = 0$$

$$\therefore a = 1, b = -2, c = -6$$

$$\therefore X = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-6)}}{2 \times 1}$$

$$= \frac{2 \pm \sqrt{28}}{2} = \frac{2 \pm 2\sqrt{7}}{2} = 1 \pm \sqrt{7}$$

$$\therefore X = 3.65 \text{ or } X = -1.65$$

$$\therefore \text{The S.S.} = \{3.65, -1.65\}$$

$$[b] \therefore n(X) = \frac{X}{X+2} + \frac{2X^3}{X^2(X+2)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-2, 0\}$$

$$n(X) = \frac{X}{X+2} + \frac{2X}{X+2} = \frac{3X}{X+2}$$

3

$$[a] \therefore n(X) = \frac{X(X+2)}{(X-2)(X^2+2X+4)} \times \frac{X^2+2X+4}{X+2}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2\}$$

$$n(X) = \frac{X}{X-2}$$

$$[b] \therefore 2X - y = 3 \quad (1)$$

$$X + 2y = 4 \quad \therefore X = 4 - 2y \quad (2)$$

$$\text{Substituting from (2) in (1)} : \therefore 2(4 - 2y) - y = 3$$

$$\therefore 8 - 4y - y = 3 \quad \therefore 8 - 5y = 3$$

$$\therefore -5y = -5 \quad \therefore y = 1$$

$$\text{Substituting in (2)} : \therefore X = 2$$

$$\therefore \text{The S.S.} = \{(2, 1)\}$$

4

$$[a] \therefore n_1(X) = \frac{X}{X(X+1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, -1\} \left. \vphantom{\begin{array}{l} \text{The domain of } n_1 \\ n_1(X) = \frac{1}{X+1} \end{array}} \right\} (1)$$

$$n_1(X) = \frac{1}{X+1}$$

$$\therefore n_2(X) = \frac{X^2(X^2 - X + 1)}{X^2(X^3 + 1)}$$

$$= \frac{X^2(X^2 - X + 1)}{X^2(X+1)(X^2 - X + 1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, -1\} \left. \vphantom{\begin{array}{l} \text{The domain of } n_2 \\ n_2(X) = \frac{1}{X+1} \end{array}} \right\} (2)$$

$$n_2(X) = \frac{1}{X+1}$$

$$\text{from (1) and (2)} : \therefore n_1 = n_2$$

$$[b] \therefore X - y = 7 \quad \therefore X = y + 7 \quad (1)$$

$$Xy = 60 \quad (2)$$

$$\text{Substituting from (1) in (2)} : \therefore (y+7)y = 60$$

$$\therefore y^2 + 7y - 60 = 0 \quad \therefore (y+12)(y-5) = 0$$

$$\therefore y = -12 \text{ or } y = 5$$

$$\text{Substituting in (1)} : \therefore X = -5 \text{ or } X = 12$$

$$\therefore \text{The S.S.} = \{(-5, -12), (12, 5)\}$$

5

$$[a] \therefore n(X) = \frac{X+1}{(X+2)(X+1)} - \frac{X+2}{(X+2)(X-2)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-2, -1, 2\}$$

Algebra and Probability

$$\begin{aligned} \therefore n(X) &= \frac{1}{x+2} - \frac{1}{x-2} \\ &= \frac{x-2-(x+2)}{(x+2)(x-2)} = \frac{x-2-x-2}{(x+2)(x-2)} \\ &= \frac{-4}{(x+2)(x-2)} \end{aligned}$$

[b] \therefore A and B are mutually exclusive events

$$\therefore P(A \cup B) = P(A) + P(B)$$

$$\therefore P(B) = P(A \cup B) - P(A) = \frac{5}{12} - \frac{1}{4} = \frac{1}{6}$$

25 North Sinai

1

1 c 2 c 3 d 4 d 5 a 6 b

2

[a] 1 $P(A \cup B) = P(A) + P(B) - P(A \cap B)$
 $= \frac{1}{2} + \frac{2}{5} - \frac{1}{5} = \frac{7}{10}$

2 $P(A - B) = P(A) - P(A \cap B)$
 $= \frac{1}{2} - \frac{1}{5} = \frac{3}{10}$

[b] $\therefore n_1(X) = \frac{-1}{(x-3)(x+3)}$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{3, -3\}$$

$$\therefore \therefore n_2(X) = \frac{7}{x}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0\}$$

$$\therefore \text{The common domain} = \mathbb{R} - \{3, -3, 0\}$$

3

[a] $\therefore x^2 - 2x - 4 = 0$

$$\therefore a = 1, b = -2, c = -4$$

$$\therefore x = \frac{2 \pm \sqrt{(-2)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{2 \pm \sqrt{20}}{2}$$

$$= \frac{2 \pm 2\sqrt{5}}{2} = 1 \pm \sqrt{5}$$

$$\therefore x \approx 3.24 \text{ or } x \approx -1.24$$

$$\therefore \text{The S.S.} = \{3.24, -1.24\}$$

[b] $\therefore n(X) = \frac{x(x-2)}{(x-2)(x+2)} + \frac{2(x+3)}{(x+3)(x+2)}$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -2, -3\}$$

$$\therefore n(X) = \frac{x}{x+2} + \frac{2}{x+2} = \frac{x+2}{x+2} = 1$$

4

[a] $\therefore x - y = 0$

$$\therefore x = y$$

(1)

$$\therefore xy = 16$$

(2)

$$\text{Substituting from (1) in (2): } \therefore y^2 = 16$$

$$\therefore y = 4 \text{ or } y = -4$$

$$\text{Substituting in (1): } \therefore x = 4 \text{ or } x = -4$$

$$\therefore \text{The S.S.} = \{(4, 4), (-4, -4)\}$$

[b] $\therefore n_1(X) = \frac{x^2}{x^2(x-1)}$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\}$$

$$\therefore n_1(X) = \frac{1}{x-1}$$

$$\therefore \therefore n_2(X) = \frac{x(x^2+x+1)}{x(x^3-1)}$$

$$= \frac{x(x^2+x+1)}{x(x-1)(x^2+x+1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\}$$

$$\therefore n_2(X) = \frac{1}{x-1}$$

$$\text{from (1) and (2): } \therefore n_1 = n_2$$

5

[a] $\therefore n(X) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \div \frac{x-1}{x^2+x+1}$

$$\therefore \text{The domain of } n = \mathbb{R} - \{1\}$$

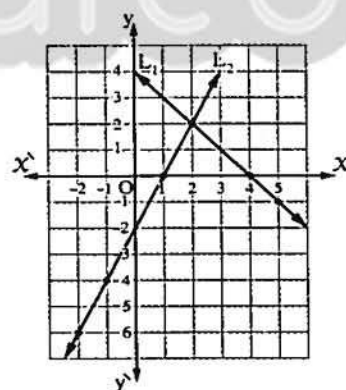
$$\therefore n(X) = \frac{(x-1)(x-1)}{(x-1)(x^2+x+1)} \times \frac{x^2+x+1}{x-1} = 1$$

[b] $x = 4 - y$

$$y = 2x - 2$$

x	2	4	5
y	2	0	-1

x	1	-1	-2
y	0	-4	-6



From the graph: \therefore the S.S. = $\{(2, 2)\}$

26 Red Sea

1

1 c

2 b

3 a

4 b

5 c

6 d

2

$$[a] \therefore 2x - y = 3 \quad (1)$$

$$\therefore x + 2y = 4 \quad \therefore x = 4 - 2y \quad (2)$$

Substituting from (2) in (1):

$$\therefore 2(4 - 2y) - y = 3 \quad \therefore 8 - 4y - y = 3$$

$$\therefore 8 - 5y = 3 \quad \therefore -5y = -5 \quad \therefore y = 1$$

Substituting in (2): $\therefore x = 2$

$$\therefore \text{The S.S.} = \{(2, 1)\}$$

$$[b] \therefore n(x) = \frac{x^2}{x-1} - \frac{x}{x-1}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{1\}$$

$$\therefore n(x) = \frac{x^2}{x-1} - \frac{x}{x-1} = \frac{x^2 - x}{x-1} = \frac{x(x-1)}{x-1} = x$$

3

$$[a] \therefore x^2 - x - 4 = 0$$

$$\therefore a = 1, b = -1, c = -4$$

$$\therefore x = \frac{1 \pm \sqrt{(-1)^2 - 4 \times 1 \times (-4)}}{2 \times 1} = \frac{1 \pm \sqrt{17}}{2}$$

$$\therefore x \approx 2.56 \quad \text{or } x \approx -1.56$$

$$[b] \therefore n_1(x) = \frac{(x+1)(x^2 - x + 1)}{x(x^2 - x + 1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0\} \quad (1)$$

$$\therefore n_1(x) = \frac{x+1}{x}$$

$$\therefore n_2(x) = \frac{x^2(x+1) + x + 1}{x(x^2 + 1)} = \frac{x+1(x^2 + 1)}{x(x^2 + 1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0\} \quad (2)$$

$$\therefore n_2(x) = \frac{x+1}{x}$$

From (1) and (2): $\therefore n_1 = n_2$

4

$$[a] \therefore x - y = 1 \quad \therefore x = y + 1 \quad (1)$$

$$\therefore x^2 + y^2 = 25 \quad (2)$$

Substituting from (1) in (2): $\therefore (y+1)^2 + y^2 = 25$

$$\therefore y^2 + 2y + 1 + y^2 - 25 = 0$$

$$\therefore 2y^2 + 2y - 24 = 0$$

$$\therefore y^2 + y - 12 = 0 \quad \therefore (y+4)(y-3) = 0$$

$$\therefore y = -4 \quad \text{or } y = 3$$

Substituting in (1): $\therefore x = -3 \quad \text{or } x = 4$

$$\therefore \text{The S.S.} = \{(-3, -4), (4, 3)\}$$

$$[b] 1 \therefore n(x) = \frac{x(x-2)}{(x-2)(x-3)}$$

$$\therefore n^{-1}(x) = \frac{(x-2)(x-3)}{x(x-2)}$$

$$\therefore \text{The domain of } n^{-1} = \mathbb{R} - \{0, 2, 3\}$$

$$\therefore n^{-1}(x) = \frac{x-3}{x}$$

$$2 \therefore n^{-1}(x) = 2 \quad \therefore \frac{x-3}{x} = 2$$

$$\therefore x - 3 = 2x \quad \therefore x = -3$$

5

$$[a] \therefore n(x) = \frac{(x-2)(x^2 + 2x + 4)}{(x-2)(x+3)} \times \frac{x+3}{x^2 + 2x + 4}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{2, -3\}$$

$$\therefore n(x) = 1$$

$$[b] 1 \quad P(A \cup B) = P(A) + P(B) - P(A \cap B) \\ = 0.3 + 0.6 - 0.2 = 0.7$$

$$2 \quad P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$$

27

Matrouh

1

$$1 \quad a \quad 2 \quad c \quad 3 \quad a \quad 4 \quad b \quad 5 \quad c \quad 6 \quad d$$

2

$$[a] \therefore x + \frac{1}{x} + 3 = 0 \quad (\text{Multiplying by } x)$$

$$\therefore x^2 + 1 + 3x = 0 \quad \therefore x^2 + 3x + 1 = 0$$

$$\therefore a = 1, b = 3, c = 1$$

$$\therefore x = \frac{-3 \pm \sqrt{(3)^2 - 4 \times 1 \times 1}}{2 \times 1} = \frac{-3 \pm \sqrt{5}}{2}$$

$$\therefore x \approx -0.38 \quad \text{or } x \approx -2.62$$

$$\text{The S.S.} = \{-0.38, -2.62\}$$

$$[b] \therefore n(x) = \frac{(x-1)(x+1)}{x(x-1)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{0, 1\}$$

$$\therefore n(x) = \frac{x+1}{x}$$

3

$$[a] \therefore n(x) = \frac{x-1}{(x-1)(x+1)} \div \frac{x(x-5)}{(x+1)(x-5)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{1, -1, 5, 0\}$$

$$\therefore n(x) = \frac{x-1}{(x-1)(x+1)} \times \frac{(x+1)(x-5)}{x(x-5)} = \frac{1}{x}$$

$$[b] \text{ Let the two positive numbers be } x \text{ and } y$$

$$\therefore x + y = 9 \quad \therefore y = 9 - x \quad (1)$$

$$\therefore x^2 - y^2 = 27 \quad (2)$$

substituting from (1) in (2):

Algebra and Probability

$$\therefore x^2 - (9 - x)^2 = 27$$

$$\therefore x^2 - (81 + 18x - x^2) = 27$$

$$\therefore x^2 - 81 + 18x - x^2 = 27$$

$$\therefore 18x = 108 \quad \therefore x = 6$$

Substituting in (1) : $\therefore y = 3$

\therefore The two positive numbers are : 6 , 3

4

$$[a] \quad 1) P(A \cup B) = P(A) + P(B) - P(A \cap B)$$

$$= 0.3 + 0.6 - 0.2 = 0.7$$

$$2) P(A - B) = P(A) - P(A \cap B) = 0.3 - 0.2 = 0.1$$

$$[b] \quad \therefore n_1(x) = \frac{x^2}{x^2(x-1)}$$

$$\therefore \text{The domain of } n_1 = \mathbb{R} - \{0, 1\} \quad (1)$$

$$\therefore n_1(x) = \frac{1}{x-1}$$

$$\therefore n_2(x) = \frac{x(x^2 + x + 1)}{x(x^3 - 1)} = \frac{x(x^2 + x + 1)}{x(x-1)(x^2 + x + 1)}$$

$$\therefore \text{The domain of } n_2 = \mathbb{R} - \{0, 1\} \quad (2)$$

$$\therefore n_2(x) = \frac{1}{x-1}$$

From (1) and (2) : $\therefore n_1 = n_2$

5

$$[a] \quad \therefore n(x) = \frac{3x}{(x+1)(x-2)} - \frac{x-1}{x^2-1}$$

$$= \frac{3x}{(x+1)(x-2)} - \frac{x-1}{(x-1)(x+1)}$$

$$\therefore \text{The domain of } n = \mathbb{R} - \{-1, 2, 1\}$$

$$\therefore n(x) = \frac{3x}{(x+1)(x-2)} - \frac{1}{x+1}$$

$$= \frac{3x - (x-2)}{(x+1)(x-2)} = \frac{3x - x + 2}{(x+1)(x-2)}$$

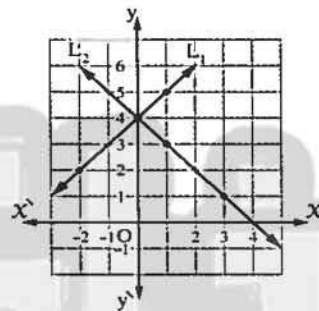
$$= \frac{2x+2}{(x+1)(x-2)} = \frac{2(x+1)}{(x+1)(x-2)} = \frac{2}{x-2}$$

$$[b] \quad y = x + 4$$

$$x = 4 - y$$

x	1	0	-2
y	5	4	2

x	3	1	0
y	1	3	4



From the graph : The S.S. = $\{(0, 4)\}$

Governorates' Examinations

1

Giza Governorate



Answer the following questions :

1 Choose the correct answer :

- (1) The set of zeroes of the function f : where $f(x) = -3x$ is
 (a) $\{0\}$ (b) $\{3\}$ (c) $\{-3\}$ (d) $\mathbb{R} - \{3\}$
- (2) If $A \subset S$ of a random experiment , $P(A) = P(\bar{A})$, then $P(A) = \dots\dots\dots$
 (a) 1 (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) $\frac{1}{8}$
- (3) If x is a negative number, then the greatest number of the following is
 (a) $5x$ (b) $\frac{5}{x}$ (c) $5 + x$ (d) $5 - x$
- (4) The domain of the function $f : f(x) = \frac{x-3}{4}$ is
 (a) \mathbb{R} (b) $\mathbb{R} - \{-4\}$ (c) $\mathbb{R} - \{-4, 3\}$ (d) \emptyset
- (5) If the sum of ages of a father and his son now is 47 years , then the sum of their ages after 10 years = years.
 (a) 27 (b) 37 (c) 57 (d) 67
- (6) If the two equations $x + 2y = 1$, $2x + ky = 2$ has only one solution , then $k \neq \dots\dots\dots$
 (a) 1 (b) 2 (c) 4 (d) -4

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations algebraically :

$$x + 3y = 7 \quad , \quad 5x - y = 3$$

[b] Find $n(x)$ in its simplest form , showing the domain of n :

$$n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{x + 5}{x^2 + 4x - 5}$$

3 [a] Find in \mathbb{R} the solution set of the following equation by using the general rule :

$$x^2 - 4x + 1 = 0 \text{ rounding the results to two decimal places.}$$

[b] If $n_1(x) = \frac{2x}{2x+6}$, $n_2(x) = \frac{x^2+3x}{x^2+6x+9}$, then prove that : $n_1 = n_2$

- 4** [a] If A and B are two events from a sample space of a random experiment , and
 $P(A) = 0.7$, $P(B) = 0.6$, $P(A \cap B) = 0.4$, then find :

(1) $P(A \cup B)$ (2) $P(A - B)$

- [b] Find $n(X)$ in its simplest form , showing the domain of n :

$$n(X) = \frac{X^3 - 8}{X^2 - 3X + 2} \times \frac{X + 1}{X^2 + 2X + 4}$$

- 5** [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two following equations :

$$X - y = 1 \quad , \quad X^2 - y^2 = 25$$

[b] If $n(X) = \frac{X^2 - 3X}{(X - 3)(X^2 + 2)}$

, then find : $n^{-1}(X)$ in the simplest form , showing the domain of n^{-1} .

2 Alexandria Governorate



Answer the following questions :

- 1** Choose the correct answer from those given ones :

- (1) If A , B are two mutually exclusive events , $P(B) = 0.5$ and $P(A \cup B) = 0.7$
 , then $P(A) = \dots\dots\dots$

(a) 0.02 (b) 0.2 (c) 0.5 (d) 0.13

(2) $(X + 1)^2 = \dots\dots\dots$

(a) $X^2 + 1$ (b) $X^2 - 1$ (c) $X^2 - X + 1$ (d) $X^2 + 2X + 1$

(3) The additive inverse of the fraction $\frac{3}{X^2 + 1}$ is $\dots\dots\dots$

(a) $\frac{-3}{X^2 + 1}$ (b) $\frac{X^2 + 1}{3}$ (c) $\frac{X^2 + 1}{-3}$ (d) $\frac{3}{X^2 - 1}$

- (4) If X is a negative real number , then the greatest number of the following numbers
 is $\dots\dots\dots$

(a) $3 + X$ (b) $3X$ (c) $3 - X$ (d) $\frac{3}{X}$

(5) If $X = 2$ and $y = 3$, then $(y - 2X)^{10} = \dots\dots\dots$

(a) 10 (b) -1 (c) -10 (d) 1

- (6) The point of intersection of the two straight lines $X = 2$ and $X + y = 6$ is $\dots\dots\dots$

(a) (2 , 6) (b) (2 , 4) (c) (4 , 2) (d) (6 , 2)

- 2** [a] If A and B are two events of the sample space (S) of a random experiment such that :
 $P(A) = 0.7$, $P(A \cap B) = 0.3$ Find : $P(A - B)$

[b] Find $n(X)$ in the simplest form showing the domain of n , where :

$$n(X) = \frac{X^2 + 2X + 4}{X^3 - 8} - \frac{9 - X^2}{X^2 + X - 6}$$

- 3** [a] Find the common domain of n_1 , n_2 to be equal such that :

$$n_1(X) = \frac{X^2 + 3X + 2}{X^2 - 4} , \quad n_2(X) = \frac{X^2 - 1}{X^2 - 3X + 2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $X + y = 7$, $X^2 + y^2 = 25$

- 4** [a] Find $n(X)$ in the simplest form showing the domain of n , where :

$$n(X) = \frac{X}{X-2} \div \frac{X+3}{X^2 - X - 2}$$

[b] Find in \mathbb{R} the solution set of the equation : $3X^2 - 5X - 4 = 0$

, by using the general rule , rounding the result to two decimal places.

- 5** [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations graphically :

$$X + y = 4 , \quad 2X - y = 2$$

[b] If set of zeroes of the function $f : f(X) = aX^2 + X + b$ is $\{0, 1\}$

find the value of each two constants a and b

3 El-Kalyoubia Governorate



Answer the following questions :

- 1** Choose the correct answer :

(1) Twice the number X subtracted by 3 is

- (a) $X - 3$ (b) $2X + 3$ (c) $2X - 3$ (d) $3 - 2X$

(2) The domain of the function f where $f(X) = \frac{X+2}{5X}$ is

- (a) $\mathbb{R} - \{5\}$ (b) $\mathbb{R} - \{-5\}$ (c) \mathbb{R} (d) $\mathbb{R} - \{\text{zero}\}$

(3) If $P(A) = 4P(\bar{A})$, then $P(A) =$

- (a) 0.8 (b) 0.6 (c) 0.4 (d) 0.2

(4) If X is a negative number , then the greatest number of the following is

- (a) $5 - X$ (b) $5 + X$ (c) $\frac{5}{X}$ (d) $5X$

(5) If $2^7 \times 3^7 = 6^k$, then $k = \dots\dots\dots$

- (a) 14 (b) 7 (c) 6 (d) 5

(6) If $x^2 - y^2 = 2(x + y)$ where $(x + y) \neq \text{zero}$, then $(x - y) = \dots\dots\dots$

- (a) 2 (b) 4 (c) 6 (d) 8

2 [a] If $n(x) = \frac{x^3 - 8}{x^2 - x - 2} \div \frac{x^2 + 2x + 4}{2x^2 - x - 3}$

Find $n(x)$ in its simplest form showing the domain of n

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$2x = 1 - y$, $x + 2y = 5$ in $\mathbb{R} \times \mathbb{R}$

3 [a] If A, B are two events in a random experiment , $P(A) = 0.7$, $P(B) = 0.6$
and $P(A \cap B) = 0.4$

Find : (1) $P(A \cup B)$ (2) $P(A - B)$

[b] Find the solution set of the two equations : $y - x = 3$, $x^2 + y^2 - xy = 13$ in \mathbb{R}^2

4 [a] If $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{x - 5}{x^2 - 6x + 5}$ Find $n(x)$ in its simplest form , showing the domain of n

[b] By using the formula , find in \mathbb{R} the solution set of the equation : $x^2 - 2x - 6 = 0$
(Approximate to the nearest one decimal)

5 [a] If $n_1(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$, $n_2(x) = \frac{2x}{2x + 4}$, prove that : $n_1 = n_2$

[b] If $n(x) = \frac{x - 2}{x + 1}$

Find : (1) The domain of n^{-1} (2) $n^{-1}(3)$

4

El-Sharkia Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

(1) In the experiment of rolling a regular die once , the probability of appearance of an even number on the upper face =

- (a) $\frac{1}{6}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) $\frac{5}{6}$

(2) The set of zeroes of the function $f : f(x) = x^2 + 1$ is

- (a) $\{1\}$ (b) $\{-1\}$ (c) $\{-1, 1\}$ (d) \emptyset

(3) The point of intersection of the two straight lines $x + 2 = 0$ and $y - 3 = 0$ is

- (a) $(-2, -3)$ (b) $(-2, 3)$ (c) $(2, -3)$ (d) $(2, 3)$

(4) If $2^5 \times 3^5 = m \times 6^4$, then $m =$

- (a) 1 (b) 2 (c) 3 (d) 6

(5) The domain of the multiplicative inverse of the algebraic fraction $\frac{x+2}{x+5}$ is

- (a) \mathbb{R} (b) $\mathbb{R} - \{-5\}$ (c) $\mathbb{R} - \{-2\}$ (d) $\mathbb{R} - \{-2, -5\}$

(6) If $(7^{a-2}, 3) = (1, b+5)$, then $a + b =$

- (a) -1 (b) zero (c) 1 (d) 2

2 [a] By using the general rule solve in \mathbb{R} the equation : $x(x-1) = 4$ taking $\sqrt{17} \approx 4.12$

[b] If A and B are two events in a sample space for a random experiment, and if

$$P(A) = 0.8, P(B) = 0.7 \text{ and } P(A \cap B) = 0.6$$

Find : (1) The probability of non occurrence of the event A

(2) The probability of occurrence one of the two events at least.

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 4$, $3x + 2y = 7$

[b] If $n_1(x) = \frac{x^2 - 3x + 9}{x^3 + 27}$, $n_2(x) = \frac{2}{2x + 6}$ **Prove that :** $n_1 = n_2$

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $x - y = 1$, $x^2 - y^2 = 5$

[b] Find $n(x)$ in the simplest form showing the domain :

$$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} - \frac{9 - x^2}{x^2 + x - 6} \text{ and find : } n(58)$$

5 [a] If $n(x) = \frac{x^3 - x}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x}$

Find : $n(x)$ in the simplest form showing the domain.

[b] If the set of zeroes of the function f where $f(x) = \frac{ax^2 - 6x + 8}{bx - 4}$ is $\{4\}$ and its domain is $\mathbb{R} - \{2\}$, then find : a, b

5

El-Monofia Governorate



Answer the following questions :

1 Choose the correct answer :

- (1) If $a < \sqrt[3]{3} < b$, then (a, b) is
- (a) $(0, 1)$ (b) $(2.5, 3.5)$ (c) $(1, 2)$ (d) $(2, 3)$
- (2) If the curve of the quadratic function does not intersect the X -axis at any point, then the number of solutions of the equation $f(X) = 0$ in \mathbb{R} is
- (a) zero (b) one solution. (c) two solutions. (d) an infinite number.
- (3) If $2^8 \times 3^8 = X \times 6^8$, then $X = \dots\dots\dots$
- (a) 2 (b) 3 (c) 6 (d) 1
- (4) The set of zeroes of the function $f : f(X) = \frac{X^2 - 9}{X - 3}$ is
- (a) $\{3\}$ (b) $\{-3\}$ (c) $\{3, -3\}$ (d) \emptyset
- (5) If $f(X) = 6X^2 + 3X(1 - 2X)$ is a polynomial function, then its degree is
- (a) first. (b) second. (c) third. (d) fourth.
- (6) If A and B are two mutually exclusive events of random experiment then :
 $P(A \cap B) = \dots\dots\dots$
- (a) $P(A \cup B)$ (b) $P(A) + P(B)$ (c) \emptyset (d) zero

2 [a] If $(2a + b, 3) = (18, a - b)$:

Find the value of a and b (Indicating the steps of the solution).

[b] By using the general formula, find in \mathbb{R} the solution set for the following equation :

$$(X - 4)(X - 2) = 1 \text{ (knowing that : } \sqrt{2} \approx 1.41)$$

3 [a] If the domain of the function n where : $n(X) = \frac{4}{X + a} + \frac{b}{2X}$

is $\mathbb{R} - \{0, -5\}$ and $n(3) = 1$, find the values of a and b

[b] Find $n(X)$ in the simplest form showing the domain where :

$$n(X) = \frac{X^2 + 4X + 3}{X - 1} \div \frac{X^2 + 3X}{X^2 - X}$$

4 [a] Find $n(X)$ in the simplest form showing the domain where :

$$n(X) = \frac{X^2 + X + 1}{X^4 - X} + \frac{X + 3}{3 - 2X - X^2} \text{ and if } n(a) = -2, \text{ find the value of a}$$

- [b] A right angled triangle in which the length of one of the sides of right angled is 5 cm. and its perimeter is 30 cm. Find the area of the triangle.
(Indicating the steps of the solution).

5 [a] If $n_1(X) = \frac{X^2 - 4}{X^2 + X - 6}$, $n_2(X) = \frac{X^3 - X^2 - 6X}{X^3 - 9X}$

Prove that : $n_1(X) = n_2(X)$ for all values of X which belong to the common domain and find this domain.

- [b] If A and B are two events of the sample space of a random experiment
 $P(A) = \frac{5}{9}$, $P(B) = \frac{2}{9}$, $P(A \cap B) = \frac{1}{9}$

Find : (1) $P(A \cup B)$

- (2) The probability of non occurrence any of the two events.
(3) The probability of occurrence of event A only.

6 El-Gharbia Governorate



Answer the following questions :

1 Choose the correct answer from those given :

- (1) If the solution set of the equation $X^2 - aX + 4 = 0$ is $\{-2\}$, then $a = \dots\dots\dots$

(a) -2 (b) -4 (c) 2 (d) 4

- (2) If $n(X) = \frac{X+2}{X-5}$, then the domain of n^{-1} is $\dots\dots\dots$

(a) $\{2, -5\}$ (b) $\{-2, 5\}$ (c) $\mathbb{R} - \{-2, 5\}$ (d) $\mathbb{R} - \{2, -5\}$

- (3) If A and B are two mutually exclusive events of a random experiment

, if $P(A) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$, then $P(B) = \dots\dots\dots$

(a) $\frac{1}{4}$ (b) $\frac{1}{3}$ (c) $\frac{1}{2}$ (d) 1

- (4) The set of zeroes of the function $f : f(X) = \frac{X^2 - X - 2}{X^2 + 4}$ is $\dots\dots\dots$

(a) $\{2, -2\}$ (b) $\{-2, -1\}$ (c) $\{2, -1\}$ (d) $\{1, -1\}$

- (5) The point of intersection of the two straight lines : $y = 2$, $X + y = 6$ is $\dots\dots\dots$

(a) (4 , 2) (b) (2 , 4) (c) (2 , 2) (d) (4 , 4)

- (6) If the curve of the function $f : f(X) = X^2 - X + c$ passing through the point (2 , 1) , then $c = \dots\dots\dots$

(a) 2 (b) 1 (c) -2 (d) -1

- 2 [a] Find in \mathbb{R} the solution set of the following equation , using the general rule , rounding the results to two decimal places : $X(X-1) = 4$

[b] Find : $n(X) = \frac{X^3 - 8}{X^2 + X - 6} \times \frac{X + 3}{X^2 + 2X + 4}$ in the simplest form showing the domain.

- 3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations : $y - X = 2$ and $X^2 + Xy - 4 = 0$

[b] Find $n(X)$ in the simplest form , showing the domain where : $n(X) = \frac{3}{X+1} + \frac{2X+1}{1-X^2}$

- 4 [a] Draw the graphical representation of the function $f(X) = X^2 - 2X - 3$ in the interval $[-2, 4]$ and from the drawing , find the solution set of the equation $X^2 - 2X - 3 = 0$

- [b] Find $n(X)$ in the simplest form , showing the domain of n where :

$$n(X) = \frac{X^2 - 2X + 1}{X^3 - 1} \div \frac{X - 1}{X^2 + X + 1}$$

- 5 [a] If $n(X) = \frac{X^2 - 2X}{(X-2)(X^2 + 2)}$

(1) Find $n^{-1}(X)$ in the simplest form and determine the domain of n^{-1}

(2) If $n^{-1}(X) = 3$ what is the value of X ?

- [b] If A and B are two events in the sample space of a random experiment and if

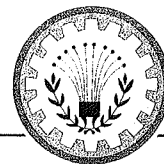
$$P(A) = 0.7, \quad P(B) = 0.6 \text{ and } P(A \cap B) = 0.4$$

Find : (1) $P(A \cup B)$

(2) Probability occurrence of one event without the other.

7

El-Dakahlia Governorate



Answer the following questions : (Calculators are permitted)

- 1 [a] Choose the correct answer from the given answers :

(1) The point of intersection of the two straight lines : $X + 2 = 0$ and $y = X$ is

- (a) (2 , 2) (b) (2 , 0) (c) (-2 , -2) (d) (0 , 0)

(2) If $n(X) = \frac{X+1}{X-2}$ is an algebraic fraction , then the domain in which the fraction has multiplicative inverse is

- (a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-1, 2\}$ (c) $\mathbb{R} - \{-1\}$ (d) $\{-1, 2\}$

(3) If there is only one solution for the equation :

$X + 2y = 1$ and $2X + ky = 2$ in $\mathbb{R} \times \mathbb{R}$, then k cannot equal

- (a) 2 (b) 4 (c) -2 (d) -4

[b] Find in \mathbb{R} the solution set of the equation $X(X-3) = -1$, using the general formula (approximating the results to the nearest tenth)

2 [a] Choose the correct answer from the given answers :

(1) If the curve of the quadratic function f passes through the points $(2, 0)$, $(-3, 0)$ and $(0, -6)$, then the solution set of the equation $f(X) = 0$ in \mathbb{R} is

- (a) $\{-2, 3\}$ (b) $\{3, 2\}$ (c) $\{2, -3\}$ (d) $\{-3, -6\}$

(2) The simplest form of the function $n : n(X) = \frac{3-X}{X-3}$ such that $X \in \mathbb{R} - \{3\}$ is

- (a) 1 (b) -1 (c) 3 (d) -3

(3) If A is an event of random experiment , then $P(\bar{A}) = \dots\dots\dots$

- (a) 1 (b) -1 (c) $1 - P(A)$ (d) $P(A) - 1$

[b] If $(a, 2b)$ is a solution for the equations $3X - y = 5$ and $X + y = -1$, find the value of a and b

3 [a] n_1, n_2 are two algebraic fractions such that : $n_1(X) = \frac{X^2 - 4}{X^2 + X - 6}$ and $n_2(X) = \frac{X^2 - X - 6}{X^2 - 9}$

Prove that : $n_1(X) = n_2(X)$ for all values of X which belong to the common domain and find this domain.

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of pair of equations : $X + y = 3$ and $X^2 + Xy = 6$

4 [a] If $n(X) = \frac{X^2 + 3X}{X^2 + 2X - 3} - \frac{X - 2}{X^2 - 3X + 2}$

Find $n(X)$ in simplest form showing the domain of n

[b] Find $n(X)$ in simplest form showing the domain of n , such that :

$n(X) = \frac{X^3 - X^2 - 2X}{X^2 - 5X + 6} \times \frac{X^2 + 2X - 15}{X^3 + 6X^2 + 5X}$, then find $n(7)$, $n(3)$ if possible.

5 [a] If $f_1(X) = \frac{X-a}{X+b}$, and the set of zeroes of f_1 is $\{5\}$, and the domain of f_1 is $\mathbb{R} - \{3\}$,

then find the values of a and b

If $f_2(X) = \frac{X-1}{X-3}$, then find $f_1(X) + f_2(X)$ in the simplest form.

[b] If A and B are two events in a sample space of a random experiment and

$P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cap B) = 0.4$, then find :

(1) $P(A \cup B)$

(2) The probability of occurrence of one of the two events but not the other.

8

Ismailia Governorate



Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from those given answers :

(1) If the age of a man now is x year , then his age after 5 years from now is years.

(a) $x - 5$

(b) $5 - x$

(c) $5x$

(d) $x + 5$

(2) The set of zero is of f where $f(x) = x(x^2 - 2x + 1)$ is

(a) $\{0, 1\}$

(b) $\{0, -1\}$

(c) $\{-1, 1\}$

(d) $\{0, 1, -1\}$

(3) If $(5, x - 4) = (y, 3)$, then $x + y =$

(a) 25

(b) 12

(c) 8

(d) 6

(4) Number of solutions of the two equations : $x + y = 2$, $y - 3 = 0$ together is

(a) 3

(b) 2

(c) 1

(d) zero

(5) If A and B are two mutually exclusive events , then $P(A - B) =$

(a) zero

(b) $P(A)$

(c) $P(B)$

(d) $P(A \cup B)$

(6) If the curve of the function f where $f(x) = x^2 - a$ passes through the point $(1, 0)$, then $a =$

(a) -2

(b) -1

(c) zero

(d) 1

2 [a] Find the solution set of the following equation in \mathbb{R} :

$x(x - 2) = 4$ (knowing that : $\sqrt{5} \approx 2.2$)

[b] If $n(x) = \frac{x^2 - 2x}{x^2 - 5x + 6}$

Find : $n^{-1}(x)$ in the simplest form showing the domain of n^{-1}

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations (algebraically) :

$x + y = 5$, $x^2 + xy = 15$

[b] Find $n(x)$ in the simplest form where : $n(x) = \frac{x}{x-4} - \frac{4x+16}{x^2-16}$

- 4** [a] A classroom consists of 40 students, 30 of them succeeded in math, 24 in science and 20 in both math and science. If a student is chosen randomly.

Find the probability that this student is :

- (1) fail in math. (2) succeeded in math. or science

- [b] Find $n(x)$ in the simplest form showing the domain of n :**

$$n(x) = \frac{x^2 - x - 2}{x^2 - 1} \div \frac{x - 5}{x^2 - 6x + 5}$$

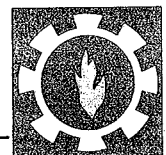
- 5** [a] Find $n(x)$ in the simplest form where : $n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} + \frac{1}{x + 2}$

- [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations (graphically) :**

$$y = 3x - 1, \quad x - y + 1 = \text{zero}$$

9

Suez Governorate



Answer the following questions : (Calculators are permitted)

- 1** Choose the correct answer from those given :

(1) The set of zeroes of f where $f(x) = (x - 1)^2(x + 2)$ is

- (a) $\{1, -2\}$ (b) $\{-1, 2\}$ (c) $\{-1, -2\}$ (d) $\{1, 2\}$

(2) If $x - y = 2$, $x^2 - y^2 = 10$, then $x + y =$

- (a) -5 (b) 2 (c) -2 (d) 5

(3) If $A \subset S$ of a random experiment, $P(A) = P(\bar{A})$, then $P(A) =$

- (a) zero (b) 1 (c) $\frac{1}{2}$ (d) $\frac{1}{4}$

(4) If x is a negative number, then the greatest number is

- (a) $3 + x$ (b) $3 - x$ (c) $3x$ (d) $\frac{3}{x}$

(5) If $x = 3$ belongs to the solution set of the equation : $x^2 - ax - 6 = 0$, then $a =$

- (a) 3 (b) 2 (c) 1 (d) -1

(6) The function f where $f(x) = \frac{x-3}{x-4}$ has additive inverse in the domain

- (a) $\mathbb{R} - \{3\}$ (b) $\mathbb{R} - \{4\}$ (c) $\mathbb{R} - \{-4\}$ (d) $\mathbb{R} - \{-3\}$

- 2** [a] Find the solution set in $\mathbb{R} \times \mathbb{R}$: $2x - y = 7$, $3x + y = 8$

(Explain your answer showing the steps solution)

- [b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x}{x+1} + \frac{x^2}{x^3 + x^2}, \text{ then calculate } n(3)$$

- 3** [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$$x - 1 = 0 \quad , \quad x^2 + y^2 = 10$$

- [b] If the fraction $\frac{x+2}{x^2-4}$ is the multiplicative inverse of $\frac{x-2}{h}$ where $x \notin \{2, -2\}$,
then calculate h

- 4** [a] Find in \mathbb{R} the solution set for the following equations by using the formula in :

$$x^2 - 3x + 1 = 0 \quad , \quad \text{knowing that } \sqrt{5} = 2.24$$

- [b] If $n_1(x) = \frac{3x}{3x+3}$, $n_2(x) = \frac{x^2+x}{x^2+2x+1}$ **Prove that : $n_1 = n_2$**

- 5** [a] Find $n(x)$ in the simplest form showing the domain of n where :

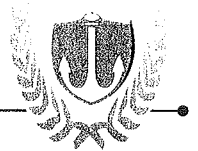
$$n(x) = \frac{x^2 + 2x + 1}{2x - 8} - \frac{x - 4}{x + 1}$$

- [b] If A and B are two events from the sample of a random experiment and

$$P(A) = 0.6 \quad , \quad P(B) = 0.3 \quad , \quad P(A \cap B) = 0.5$$

Find : (1) $P(A \cup B)$ (2) $P(\bar{B})$

10 Port Said Governorate



Answer the following questions :

- 1** Choose the correct answer from those given :

- (1) If the two equations : $x + 3y = 4$, $x + ay = 7$ represent two parallel straight lines ,
then $a = \dots\dots\dots$

(a) $-\frac{1}{3}$ (b) -3 (c) 3 (d) 1

- (2) The domain of the multiplicative inverse of the fraction : $\frac{x-2}{x^3+27}$ is $\dots\dots\dots$

(a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-3, 2\}$ (c) $\mathbb{R} - \{2, -3, 3\}$ (d) $\mathbb{R} - \{3, -3\}$

(3) If $x^2 - y^2 = 2(x + y)$ such that : $x + y \neq 0$; then $x - y = \dots\dots\dots$

- (a) 2 (b) 4 (c) 6 (d) 8

(4) If a die is tossed once , then the probability of appearance of an odd number equals $\dots\dots\dots$

- (a) $\frac{1}{3}$ (b) $\frac{1}{2}$ (c) 1 (d) 3

(5) The degree of the equation : $3x + 4y + xy = 5$ is $\dots\dots\dots$

- (a) zero. (b) first. (c) second. (d) third.

(6) If $2x = 1$, then $\frac{1}{5}x = \dots\dots\dots$

- (a) $\frac{2}{5}$ (b) $\frac{1}{5}$ (c) $\frac{1}{2}$ (d) $\frac{1}{10}$

2 [a] Solve in \mathbb{R} the equation : $2x(x - 5) = 1$ approximate to the nearest one decimal.

[b] Find the common domain of $n_1(x)$, $n_2(x)$ to be equal such that :

$$n_1(x) = \frac{x^2 + 9x + 20}{x^2 - 16} \quad , \quad n_2(x) = \frac{x^2 + 5x}{x^2 - 4x}$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - 2y = 0 \quad , \quad x^2 - y^2 = 3$$

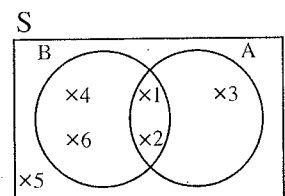
[b] If $n(x) = \frac{x+3}{x^2+5x-14} \div \frac{x^2+3x}{2x+14}$

Find : $n(x)$ in its simplest form , showing the domain of n

4 [a] Find n in its simplest form , showing its domain where : $n(x) = \frac{x^2 + x}{x^2 - 1} + \frac{x - 5}{x^2 - 6x + 5}$

[b] Use the opposite Venn diagram to calculate the probability of :

- (1) Non occurrence of the event A
(2) The occurrence of the event B only.
(3) Occurrence of A or B



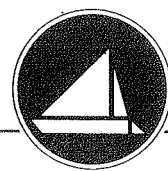
5 [a] If $n(x) = \frac{x^2 - 2x}{(x-2)(x+2)}$

- (1) **Find : $n^{-1}(x)$** (2) **If $n^{-1}(x) = 3$ what is the value of x ?**

[b] Two number , if three times a number is added to twice a second number the sum is 13 and if the first number is added to three times the second number the sum is 16 , find the two number.

11

Damietta Governorate



Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from the given ones :

(1) The solution set of the equation : $aX^2 + bX + c = 0$, $a \neq 0$ graphically is the set of X coordinates of the points of intersection of the curve of the function $f : f(X) = aX^2 + bX + c$ with the

- (a) y-axis (b) X-axis (c) symmetric line (d) straight line $y = 2$

(2) If $a \cdot b = 12$, $b \cdot c = 20$, $a \cdot c = 15$, $a \in \mathbb{R}^+$, $b \in \mathbb{R}^+$, $c \in \mathbb{R}^+$, then $a \cdot b \cdot c = \dots\dots\dots$

- (a) 360 (b) 3600 (c) 60 (d) 36

(3) If the algebraic fraction $\frac{X-a}{X+5}$ have a multiplicative inverse which is $\frac{X+5}{X+3}$, then $a = \dots\dots\dots$

- (a) 3 (b) -5 (c) -3 (d) 5

(4) $\sqrt[3]{(-2)^4 + 3^2} = \dots\dots\dots + 3$

- (a) 2^2 (b) 2 (c) -2 (d) $(-2)^2$

(5) If $P(A) = P(\bar{A})$, then $P(A) = \dots\dots\dots$

- (a) $\frac{1}{2}$ (b) 1 (c) $\frac{3}{4}$ (d) 0

(6) $X^3 - 1 = \dots\dots\dots$

- (a) $(X^2 - 1)(X + 1)$ (b) $(X - 1)(X^2 + 2X + 1)$
(c) $(X - 1)(X^2 + X + 1)$ (d) $(X - 1)(X^2 - 2X - 1)$

2 [a] Find : $n(X) = \frac{X-3}{X^2-7X+12} - \frac{4}{X^2-4X}$ in the simplest form showing the domain of n

[b] Find the value of a and b , knowing that : $\{(3, -1)\}$ is the solution set of the two equations : $aX + bY - 5 = 0$, $3aX + bY = 17$

3 [a] Find in \mathbb{R} the solution set for the equation $X(X-1) = 4$ using the general rule to the nearest hundredth.

[b] Find the common domain of f_1 , f_2 to be equal such that :

$$f_1(X) = \frac{X^2 + X - 12}{X^2 + 5X + 4} , \quad f_2(X) = \frac{X^2 - 2X - 3}{X^2 + 2X + 1}$$

- 4** [a] Two acute angles in a right-angled triangle the difference between their measures is 50° . Find the measure of each angle.

[b] Find $n(X)$ in the simplest form showing the domain :

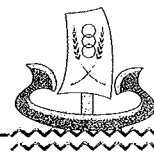
$$n(X) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 15}{x^2 - 4x - 5}$$

- 5** [a] If A and B are two events from a sample space of a random experiment and $P(A) = 0.4$, $P(B) = 0.5$, $P(A \cup B) = 0.7$

Find : (1) $P(A \cap B)$ (2) $P(B - A)$

- [b] If $n(X) = \frac{x + \frac{1}{x}}{4x + \frac{4}{x}}$ Find $n(X)$ in the simplest form showing the domain.

12 Kafr El-Sheikh Governorate



Answer the following questions : (Calculator is allowed)

- 1** [a] Choose the correct answer from those given :

(1) If $X = y + 1$, $(X - y)^2 + y = 3$, then $y = \dots\dots\dots$

(a) zero (b) 1 (c) 2 (d) 3

(2) If $a \cdot b = 3$, $a \cdot b^2 = 12$, then $b = \dots\dots\dots$

(a) 4 (b) 2 (c) -2 (d) ± 2

(3) If $n(X) = \frac{x-1}{x-2}$, then the domain of $n^{-1} = \dots\dots\dots$

(a) \mathbb{R} (b) $\mathbb{R} - \{1\}$ (c) $\mathbb{R} - \{2\}$ (d) $\mathbb{R} - \{1, 2\}$

[b] Solve in $\mathbb{R} \times \mathbb{R}$ the two simultaneous equations :

$$x - y = 1 \quad , \quad x^2 + y^2 = 25$$

- 2** [a] Choose the correct answer from those given :

(1) The probability of the impossible event equals $\dots\dots\dots$

(a) \emptyset (b) zero (c) 1 (d) -1

(2) If the solution set of the equation : $x^2 + m \cdot x + 9 = 0$ is $\{-3\}$, then $m = \dots\dots\dots$

(a) 5 (b) 6 (c) ± 6 (d) zero

(3) If the two equations : $x + 3y = 6$, $2x + ky = 12$ have an infinite number of solution in $\mathbb{R} \times \mathbb{R}$, then $k = \dots\dots\dots$

(a) 2 (b) 6 (c) 3 (d) 1

[b] Two acute angles in a right-angled triangle the difference between their measures is 50°
Find the measure of each angle.

3 [a] Solve in \mathbb{R} using the (general rule) the equation : $3x^2 = 5x + 4$ approximating the result to the nearest two decimals.

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{3}{x+1} + \frac{2x+1}{1-x^2}$$

4 [a] If A, B are two events from a sample space of random experiment , and

$$P(B) = \frac{1}{12}, \quad P(A \cup B) = \frac{1}{3}, \text{ then find } P(A) \text{ if :}$$

(1) A and B are two mutually exclusive events.

(2) $B \subset A$

[b] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$ Prove that : $n_1 = n_2$

5 [a] If $n(x) = \frac{x^2 - 5x}{(x-5)(x^2+1)}$

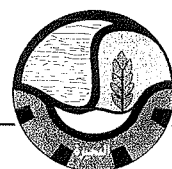
(1) Find $n^{-1}(x)$ and identify the domain of n^{-1}

(2) If $n^{-1}(x) = 2$, find the value of x

[b] If $n(x) = \frac{x^2 - 3x}{x^2 - 9} \div \frac{2x}{x+3}$

Find $n(x)$ in the simplest form showing the domain of n

13 El-Beheira Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from the given ones :

(1) If $f(x) = 2x$, then $f(1) - f(-1) = \dots\dots\dots$

(a) zero

(b) 4

(c) 2

(d) -2

(2) The two straight lines : $x + 5y = 1$, $x + 5y - 8 = 0$ are $\dots\dots\dots$

(a) parallel.

(b) coincide.

(c) intersect and non perpendicular.

(d) perpendicular.

(3) If $n(x^2) = 9$, then $n(x) = \dots\dots\dots$

(a) 81

(b) 3

(c) ± 3

(d) -3

(4) If $n(x) = \frac{x-2}{x^2-x-6}$, then the domain of n^{-1} is

- (a) $\mathbb{R} - \{2\}$ (b) $\mathbb{R} - \{-2, 3\}$ (c) $\mathbb{R} - \{-2, 2\}$ (d) $\mathbb{R} - \{-2, 2, 3\}$

(5) The degree of the equation : $3x + 4y + xy = 5$ is

- (a) zero. (b) first. (c) second. (d) third.

(6) A card is drawn randomly from 20 identical cards numbered from 1 to 20, then the probability that the number of the drawn card multiple of 7 is

- (a) 10 % (b) 15 % (c) 20 % (d) 25 %

2 [a] Solve in \mathbb{R} the equation : $3x^2 = 5x + 4$ approximating the result to the nearest two decimals.

[b] Simplify the function $n(x)$ where :

$$n(x) = \frac{3x}{x^2-2x} - \frac{12}{x^2-4} \text{ showing the domain of } n$$

3 [a] If $f(x) = \frac{x^2-9}{x+b}$, $f(4) = 1$ Find : b

[b] If A and B are two events in a random experiment

$$, P(A) = 0.7, P(B) = 0.6 \text{ and } P(A \cap B) = 0.4$$

Find the probability of :

- (1) Non occurrence of the event A
(2) Occurrence of one of the events but not the other.

4 [a] The sum of two rational numbers is 12, and three times the smallest number exceeds than twice the greatest number by one Find the two numbers.

[b] If $n_1(x) = \frac{x^2}{x^3-x^2}$, $n_2(x) = \frac{x^3+x^2+x}{x^4-x}$, then prove that : $n_1 = n_2$

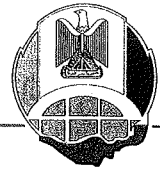
5 [a] Solve in $\mathbb{R} \times \mathbb{R}$ the two equations : $x - y = 1$, $x^2 + y^2 = 25$

[b] If $f(x) = \frac{x^2-49}{x^3-8} \div \frac{x+7}{x-2}$

Find : $f(x)$ in its simplest form showing the domain of f

14

El-Fayoum Governorate



Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from the given ones :

(1) $(2\sqrt{2})^4 = \dots\dots\dots$

(a) 8

(b) 16

(c) 32

(d) 64

(2) If A and B are mutually exclusive events from the sample space of a random experiment , then $P(A \cap B) = \dots\dots\dots$

(a) 1

(b) zero

(c) $\frac{1}{2}$

(d) - 1

(3) If $X = 1$ is the solution of the equation : $X^2 + mX + 4 = 0$, then $m = \dots\dots\dots$

(a) 1

(b) - 1

(c) zero

(d) - 5

(4) If $2X^2 = 5$, then $6X^2 = \dots\dots\dots$

(a) 5

(b) 10

(c) 15

(d) 20

(5) If $n(X) = \frac{X}{X-1}$, then the domain of $n^{-1} = \dots\dots\dots$

(a) $\mathbb{R} - \{0\}$

(b) $\mathbb{R} - \{1\}$

(c) $\mathbb{R} - \{0, 1\}$

(d) $\mathbb{R} - \{-1\}$

(6) The sum of two consecutive integers is 17 , then the smaller number of them is $\dots\dots\dots$

(a) 8

(b) 9

(c) 17

(d) 72

2 [a] If $n(X) = \frac{X^2 + X}{X^2 - X - 2} - \frac{2X + 4}{X^2 - 4}$, find $n(X)$ in the simplest form showing the domain of n

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$y = X + 1 \quad , \quad X^2 + y^2 = 13$$

3 [a] By using the general rule find in \mathbb{R} the solution set of the equation :

$$X^2 - 5X + 3 = 0 \quad , \quad \text{approximating the result to the nearest one decimal digit.}$$

[b] Find $n(X)$ in the simplest form showing the domain of n where :

$$n(X) = \frac{X^3 - 1}{X^2 - 2X + 1} \div \frac{X^2 + X + 1}{2X - 2}$$

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations graphically :

$$y = X + 1 \quad , \quad 2X + y = 7$$

[b] Find the set of zeroes of the function $f : f(X) = \frac{X-1}{X+1}$, then find $f^{-1}(2)$

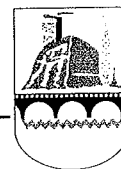
- 5** [a] Find the common domain of n_1 and n_2 to be equal such that :

$$n_1(X) = \frac{x^2 + 2x}{x^2 + 3x + 2}, \quad n_2(X) = \frac{x^2 - x}{x^2 - 1}$$

- [b] A bag contains 10 identical cards numbered from 1 to 10, one card of them is drawn randomly, calculate the probability that the number on the drawn card is :

- (1) A prime number. (2) A number divisible by 5

15 Beni Suef Governorate



Answer the following questions : (Calculator is allowed)

- 1** Choose the correct answer from those given :

- (1) The probability of the impossible event equals
 (a) \emptyset (b) 1 (c) zero (d) -1
- (2) If $2^x = 8$, then $x =$
 (a) zero (b) 1 (c) 2 (d) 3
- (3) If the two straight lines which represent the two equations :
 $x + 2y = 4$, $2x + ky = 11$ are parallel , then $k =$
 (a) 4 (b) 1 (c) -1 (d) -4
- (4) If a is a negative number , then the greatest number is
 (a) $3 + a$ (b) $3 - a$ (c) $3a$ (d) $\frac{3}{a}$
- (5) The solution set of the equation : $x^2 + 1 = 0$ in \mathbb{R} is
 (a) $\{1\}$ (b) $\{1, -1\}$ (c) $\{-1\}$ (d) \emptyset
- (6) If $n(X) = \frac{x-1}{x+2}$, then $n^{-1}(1)$ is
 (a) -1 (b) zero (c) 3 (d) undefined.

- 2** [a] Find the set of zeroes of the function $f : f(x) = x^3 - x$

- [b] Find in \mathbb{R} the solution set of the following equation by using the general formula :
 $x^2 - 5x + 3 = 0$ approximating the result to the nearest one decimal digit.

- 3** [a] Find algebraically in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x + y = 4, \quad 2x - y = 2$$

- [b] If A and B are two events from a sample space of a random experiment
 $P(A) = 0.6$, $P(B) = 0.5$ and $P(A \cap B) = 0.3$

Find : (1) $P(A - B)$ (2) $P(A \cup B)$

4 [a] If $n_1(x) = \frac{x^2 - 2x + 4}{x^3 + 8}$, $n_2(x) = \frac{3}{3x + 6}$

Prove that : $n_1 = n_2$

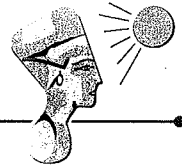
[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - 2 = 0 \quad , \quad x^2 + xy + y^2 = 7$$

5 [a] Find $n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 15}{x^2 - 4x - 5}$

in the simplest form showing the domain of n

[b] If the domain of the function $n : n(x) = \frac{x - 1}{x^2 - ax + 9}$ is $\mathbb{R} - \{3\}$
, then find the value of a

16**El-Menia Governorate**

Answer the following questions : (Calculator is allowed)

1 Choose the correct answer from those given :

(1) $(-1)^{37} - (-1)^{36} = \dots\dots\dots$

(a) -2

(b) zero

(c) 1

(d) 2

(2) The degree of the function $f : f(x) = 2x^3 + 3x^2 - 5$ is $\dots\dots\dots$

(a) fourth.

(b) fifth.

(c) third.

(d) zero.

(3) If $a + b = 7$, $a^2 - b^2 = 21$, then $a - b = \dots\dots\dots$

(a) -7

(b) 7

(c) -3

(d) 3

(4) The simplest form of the function $f : f(x) = \frac{3 - x}{x - 3}$ where $x \neq 3$ is $\dots\dots\dots$

(a) 3

(b) 1

(c) -1

(d) zero

(5) The number of solutions of the two equations :

$$x - \frac{1}{2}y = 4 \quad , \quad 2x - y = 1 \text{ in } \mathbb{R}^2 \text{ is } \dots\dots\dots$$

(a) one solution

(b) two solutions.

(c) an infinite number.

(d) zero.

(6) If a die is tossed once , then the probability of appearance of a number greater than 4 is $\dots\dots\dots$

(a) $\frac{2}{3}$

(b) $\frac{1}{6}$

(c) $\frac{1}{3}$

(d) $\frac{1}{2}$

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of :

$$x + y = \text{zero} \quad , \quad 5y^2 - 4x^2 = 36$$

[b] Find $n(x)$ in the simplest form and determine the domain of n :

$$n(x) = \frac{x-3}{x^2-7x+12} - \frac{4}{x^2-4x}$$

[3] [a] By using the general formula find in \mathbb{R} the S.S. of : $x^2 - x - 4 = 0$ where $\sqrt{17} \approx 4.12$

[b] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2+2x}{x^2+4x+4}$ Prove that : $n_1 = n_2$

[4] [a] Find $n(x)$ in the simplest form showing the domain of n : $n(x) = \frac{x^2+2x+1}{2x-8} \times \frac{x-4}{x+1}$

[b] If $(-3, 1)$ is a solution for the two equations $ax + by = 5$, $3ax + by - 17 = 0$

Find : a, b

[5] [a] If the domain of n : $n(x) = \frac{l}{x} + \frac{9}{x+m}$ is $\mathbb{R} - \{0, -2\}$, $n(4) = 1$ Find : l, m

[b] If S is the sample space of a random experiment where its outcomes are equal , A and B are two events from S , if the number of outcomes that leads to the occurrence of the event $A = 13$ and the number of all possible outcomes of the random experiment is 24 , $P(A \cup B) = \frac{5}{6}$ and $P(B) = \frac{5}{12}$

Find :

- (1) The probability of occurrence of the event A
- (2) The probability of occurrence of the events A and B together.

17 Assiut Governorate



Answer the following questions : (Calculator is allowed)

[1] Choose the correct answer :

(1) The solution set of the two equations : $x = -1$, $y - 1 = 0$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) $\{(-1, 1)\}$ (b) $\{(1, -1)\}$ (c) $\{(-1, -1)\}$ (d) $\{(1, 1)\}$

(2) The solution set of the equation : $2x + 4 = 0$ in \mathbb{N} is

- (a) $\{2\}$ (b) $\{-2\}$ (c) $\{0\}$ (d) \emptyset

(3) The domain of the function f where $f(x) = \frac{x-2}{x^2+1}$ is

- (a) $\mathbb{R} - \{-1\}$ (b) $\mathbb{R} - \{1, -1\}$ (c) $\mathbb{R} - \{1\}$ (d) \mathbb{R}

(4) If $A \subset S$, $P(A) = \frac{1}{3}$, then $P(\bar{A}) = \dots\dots\dots$

- (a) $\frac{1}{3}$ (b) $\frac{2}{3}$ (c) $\frac{1}{2}$ (d) $\frac{3}{2}$

(5) $|-5| = \dots\dots\dots$

- (a) -5 (b) $-\frac{1}{5}$ (c) 5 (d) $\frac{1}{2}$

(6) If A and B are two mutually exclusive events of a random experiment ,
then $P(A \cap B) = \dots\dots\dots$

- (a) \emptyset (b) 1 (c) zero (d) $\frac{1}{2}$

2 [a] Find algebraically the solution set of the two equations :

$$2x - y = 3 \quad , \quad x + 2y = 4$$

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2 + 2x + 4}{x^3 - 8} + \frac{x^2 + x - 2}{x^2 - 4}$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$x - y = 1 \quad , \quad x^2 + y^2 = 25$$

[b] If $n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 15}{x^2 - 4x - 5}$

, find $n(x)$ in the simplest form showing the domain of n

4 [a] Find in \mathbb{R} the solution set of the equation : $3x^2 - 5x - 1 = 0$
approximating the result to the nearest two decimals.

[b] If $n(x) = \frac{x^2 + 3x}{x^3 + 27}$, find $n^{-1}(x)$ in its simplest form showing the domain of n^{-1}

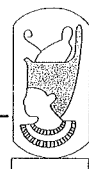
5 [a] If $n_1(x) = \frac{x^2}{x^3 - x^2}$, $n_2(x) = \frac{x^3 + x^2 + x}{x^4 - x}$ **Prove that : $n_1 = n_2$**

[b] A bag contains 15 identical balls numbered from 1 to 15 , one ball is chosen randomly , if the event A is getting an odd number and the event B is getting a number divisible by 5

Find :

- (1) $P(A)$ (2) $P(B)$ (3) $P(A - B)$

18 Souhag Governorate



Answer the following questions : (Calculator is allowed)

1 Choose the correct answer :

(1) The set of zeroes of the function f where $f(x) = \frac{x-3}{x+2}$ is

- (a) {zero} (b) {3} (c) {-2} (d) {3, -2}

(2) If $2^n = 3$, then $8^n = \dots\dots\dots$

- (a) 27 (b) 9 (c) 3 (d) 6

(3) If A and B are two mutually exclusive events of a random experiment , then $P(A \cap B) = \dots\dots\dots$

- (a) \emptyset (b) 1 (c) 2 (d) zero

(4) If $3^X + 3^X + 3^X = 9$, then $X = \dots\dots\dots$

- (a) 4 (b) 2 (c) 1 (d) 9

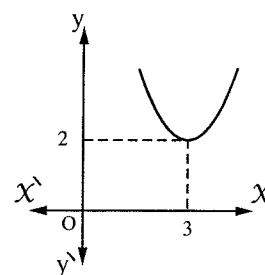
(5) If the two equations : $X + 3y = 6$, $2X + ky = 12$ have an infinit number of solutions , then $k = \dots\dots\dots$

- (a) 1 (b) 6 (c) 3 (d) 2

(6) In the opposite figure :

The solution set of $f : f(X) = 0$ is $\dots\dots\dots$

- (a) \emptyset (b) $\{3\}$
(c) $\{2, 3\}$ (d) $\{2\}$



2 [a] Solve in \mathbb{R} the equation : $2X^2 - 5X + 1 = 0$ approximating the result to the nearest two decimals.

[b] If $n_1(X) = \frac{X^2}{X^3 - X^2}$, $n_2(X) = \frac{X^3 + X^2 + X}{X^4 - X}$, prove that : $n_1 = n_2$

3 [a] Solve in $\mathbb{R} \times \mathbb{R}$ the two equations : $X - 2y = 1$, $X^2 - Xy = 0$

[b] Find $n(X)$ in the simplest form showing the domain of n where : $n(X) = \frac{X}{X+1} + \frac{2X^2}{X^3 - X}$

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$2X + y = 1 \quad , \quad X + 2y = 5$$

[b] If $n(X) = \frac{X^2 - 3X}{X^2 - 9} \div \frac{2X}{X+3}$, find $n(X)$ in its simplest form showing the domain of n

5 [a] If $n(X) = \frac{X-2}{X+1}$,

Find : (1) $n^{-1}(X)$ showing the domain of n^{-1} (2) $n^{-1}(3)$

[b] If A and B are two events in a random experiment

, $P(A) = 0.7$, $P(B) = 0.6$ and $P(A \cap B) = 0.4$

Find : (1) $P(A \cup B)$

(2) $P(A - B)$

19

Qena Governorate



Answer the following questions : (Calculators are permitted)

1 Choose the correct answer :

(1) If there are infinite numbers of solutions of the two equations

$$X + 4y = 7 \quad , \quad 3X + ky = 21 \quad , \text{ then } k = \dots\dots\dots$$

- (a) 4 (b) 7 (c) 12 (d) 21

(2) One of the solutions for the two equations : $X - y = 2$, $X^2 + y^2 = 20$ is

- (a) $(-4, 2)$ (b) $(2, -4)$ (c) $(3, 1)$ (d) $(4, 2)$

(3) The set of zeroes of f where $f(X) = X^2 - 2$ is

- (a) $\{2\}$ (b) $\{-2\}$ (c) $\{\sqrt{2}, -\sqrt{2}\}$ (d) \emptyset

(4) The simplest form of $f(X) = \frac{4X^2 - 2X}{2X}$, $X \neq 0$ is

- (a) $4X^2$ (b) $2X - 1$ (c) $2X$ (d) 2

(5) If A and B are two mutually exclusive events, then $P(A \cap B) = \dots\dots\dots$

- (a) \emptyset (b) zero (c) 0.56 (d) 1

(6) If $A \subset B$, then $P(A \cup B) = \dots\dots\dots$

- (a) zero (b) $P(A)$ (c) $P(B)$ (d) $P(A \cap B)$

2 [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$$2X - y = 3 \quad , \quad X + 2y = 4$$

[b] If $n_1(X) = \frac{2X}{2X+4}$, $n_2(X) = \frac{X^2+2X}{X^2+4X+4}$ Prove that : $n_1 = n_2$

3 [a] Find in \mathbb{R} the solution set of the following equation by using the general rule :

$$3X^2 = 5X - 1 \quad (\text{Rounding the results to two decimal places})$$

[b] Find $n(X)$ in the simplest form showing the domain of n where :

$$n(X) = \frac{X^2 + X + 1}{X} \times \frac{X^2 - X}{X^3 - 1}$$

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$$X + y = 7 \quad , \quad Xy = 12$$

[b] Find $n(X)$ in the simplest form showing the domain of n where :

$$n(X) = \frac{3X - 4}{X^2 - 5X + 6} + \frac{2X + 6}{X^2 + X - 6}$$

5 [a] If $n(X) = \frac{x^2 - 2x}{(x-2)(x^2+2)}$

(1) Find $n^{-1}(X)$ and identify the domain.

(2) If $n^{-1}(X) = 3$ what is the value of X ?

[b] If A and B are two events from the sample space of a random experiment and

$P(A) = 0.7$, $P(A \cap B) = 0.3$ Find : $P(A - B)$

20 Luxor Governorate



Answer the following questions :

1 Choose the correct answer :

(1) The set of zeroes of the function $f : f(X) = X^2 + 3$ is

(a) $\{0\}$

(b) \emptyset

(c) $\{3\}$

(d) $\{3, -3\}$

(2) $\sqrt{16+9} = 4 + \dots$

(a) 3

(b) 5

(c) 1

(d) 7

(3) If \bar{A} is the complement event of the event A in a sample space of a random experiment , then $P(A) + P(\bar{A}) = \dots$

(a) 2

(b) 1

(c) $\frac{1}{2}$

(d) 3

(4) If $3^X = 1$, then $X = \dots$

(a) 0

(b) $\frac{1}{3}$

(c) 1

(d) 3

(5) The point of intersection of the two straight lines : $y = 2$, $X + y = 6$ is

(a) (2 , 4)

(b) (2 , 6)

(c) (6 , 2)

(d) (4 , 2)

(6) If $(5, X-4) = (y+2, 3)$, then $X + y = \dots$

(a) 6

(b) 8

(c) 10

(d) 12

2 [a] Find the solution set of the two equations in \mathbb{R}^2 : $X - 2y = 0$, $X^2 - y^2 = 3$

[b] If $n(X) = \frac{X^2 - 16}{X + 4}$

Find : (1) $n^{-1}(X)$ showing the domain of n^{-1} (2) $n^{-1}(4)$ (3) $n(4)$

3 [a] If $n_1(X) = \frac{2X}{2X+4}$, $n_2(X) = \frac{X^2+2X}{X^2+4X+4}$ Prove that : $n_1 = n_2$

[b] Using the general rule find in \mathbb{R} the S.S. of the equation :

$3X^2 = 5X - 1$ (given that $\sqrt{13} \approx 3.61$)

- 4** [a] If A, B are two events of the sample space of a random experiment and if
 $P(B) = \frac{1}{12}$, $P(A \cup B) = \frac{1}{3}$

Find P (A) in the following cases :

(1) A and B are two mutually exclusive events

(2) $B \subset A$

[b] If $n(x) = \frac{x^2 + x}{x^2 - 1} - \frac{5 - x}{x^2 - 6x + 5}$

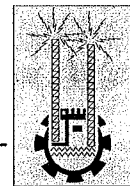
Find n (x) in the simplest form showing the domain of n.

5 [a] If $n(x) = \frac{x^3 - 1}{x^2 - 2x + 1} \times \frac{2x - 2}{x^2 + x + 1}$

Find n (x) in the simplest form showing the domain

[b] **Find graphically in $\mathbb{R} \times \mathbb{R}$ the S.S. of the two equations :**

$y = x + 4$, $x + y = 4$



21 Aswan Governorate

Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from those given :

(1) If $x + y = 5$, then $3x + 3y = \dots\dots\dots$

- (a) 5 (b) 3 (c) 8 (d) 15

(2) If $\sqrt{64 + 36} = 8 + x$, then $x = \dots\dots\dots$

- (a) 9 (b) 6 (c) 2 (d) 10

(3) The solution set of the two equations : $y - 5 = 0$, $y + x = 0$ in $\mathbb{R} \times \mathbb{R}$ is $\dots\dots\dots$

- (a) $\{(-5, 5)\}$ (b) $\{(5, -5)\}$ (c) $\{(0, 5)\}$ (d) $\{(-5, 5)\}$

(4) The set of zeroes of the function $f : f(x) = 4$ is $\dots\dots\dots$

- (a) $\{-4\}$ (b) $\{\text{zero}\}$ (c) \emptyset (d) $\{2\}$

(5) If the probability that a student succeeded is 95 % , then the probability that he does not succeed is $\dots\dots\dots$

- (a) 20 % (b) 5 % (c) 10 % (d) zero

(6) The solution set of the equation : $x^2 - 4x + 4 = 0$ in \mathbb{R} is $\dots\dots\dots$

- (a) $\{-2\}$ (b) $\{2\}$ (c) $\{4, 1\}$ (d) \emptyset

2 [a] **Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of two equations :**

$x + y = 4$, $2x - y = 2$

[b] If $n(x) = \frac{x-1}{x+3}$ find $n^{-1}(x)$ and identify the domain of n^{-1}

3 [a] If $n(x) = \frac{x^2 - 3x}{x^2 - 9} \div \frac{2x}{x+3}$, find $n(x)$ in the simplest form showing the domain of n

[b] Find in $\mathbb{R} \times \mathbb{R}$ algebraically the solution set of the two equations :

$$x - 2y = 0 \quad , \quad x^2 - y^2 = 3$$

4 [a] If A and B are two events from a sample space of a random experiment and

$$P(A) = \frac{1}{2} \quad , \quad P(B) = \frac{1}{3}$$

Find $P(A \cup B)$ if :

$$(1) P(A \cap B) = \frac{1}{8}$$

(2) A and B are mutually exclusive events.

[b] If $n(x) = \frac{x}{x^2 + 2x} + \frac{x-2}{x^2 - 4}$, find $n(x)$ in the simplest form showing the domain of n

5 [a] By using the formula find in \mathbb{R} the solution set of the equation

$$3x^2 - 5x + 1 = 0 \text{ rounding the result to two decimal places.}$$

[b] Find the common domain in which the two functions n_1 and n_2 are equal where :

$$n_1(x) = \frac{x^2 + x - 12}{x^2 + 5x + 4} \quad , \quad n_2(x) = \frac{x^2 - 2x - 3}{x^2 + 2x + 1}$$

22

South Sinai Governorate



Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from those given :

(1) The number of solutions of the two equations : $x + y = 5$ and $y - 5 = 0$ is

- (a) zero (b) 1 (c) 2 (d) 3

(2) The point $(-3, 4)$ lies in quadrant.

- (a) fourth (b) third (c) second (d) first

(3) The range of the set of the values : 7 , 3 , 6 , 9 and 5 equals

- (a) 3 (b) 4 (c) 5 (d) 6

(4) $(-3x) \times (-5y) = \dots\dots\dots$

- (a) $15xy$ (b) $8xy$ (c) $-8xy$ (d) $-15xy$

(5) If the fraction $\frac{x-a}{x+3}$ is the multiplicative inverse of $\frac{x+3}{x+5}$, then $a = \dots\dots\dots$

- (a) -5 (b) -3 (c) 3 (d) 5

(6) If A and B are two mutually exclusive events, then $P(A \cap B)$ equals

- (a) \emptyset (b) zero (c) $\frac{1}{2}$ (d) 1

2 Find $n(X)$ in the simplest form showing the domain of n where :

(1) $n(X) = \frac{X^2 + X}{X^2 - 1} - \frac{X - 5}{X^2 - 6X + 5}$ (2) $n(X) = \frac{X^2 + 2X}{X^3 - 27} \times \frac{X^2 + 3X + 9}{X + 2}$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations graphically :

$y = X + 4$, $y + X = 4$

[b] By using the formula find in \mathbb{R} the solution set of the equation : $2X^2 - 5X - 1 = 0$ approximating the result to the nearest one decimal.

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the following two equations :

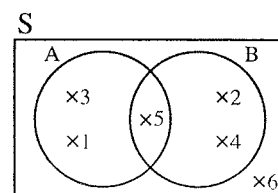
$X - y = 1$, $X^2 - Xy = 0$

[b] Use the opposite Venn diagram and find :

(1) $P(A \cap B)$

(2) $P(A \cup B)$

(3) $P(A - B)$



5 [a] If the domain of the function n where $n(X) = \frac{b}{X} + \frac{9}{X+a}$ is $\mathbb{R} - \{0, 3\}$

, $n(6) = 7$ find the values of a, b

[b] If $n_1(X) = \frac{1}{X+1}$, $n_2(X) = \frac{X^2 - X + 1}{X^3 + 1}$, then prove that : $n_1 = n_2$

23 North Sinai Governorate



Answer the following questions : (Calculators are permitted)

1 Choose the correct answer from those given :

(1) The multiplicative inverse of $\frac{\sqrt{2}}{3}$ is

- (a) $\frac{-\sqrt{2}}{3}$ (b) $\frac{3\sqrt{2}}{2}$ (c) $\frac{2\sqrt{3}}{3}$ (d) $\frac{\sqrt{3}}{2}$

(2) The S.S. of the two equations : $X - 2y = 1$, $3X + y = 10$ in $\mathbb{R} \times \mathbb{R}$ is

- (a) $\{(5, 2)\}$ (b) $\{(2, 4)\}$ (c) $\{(1, 3)\}$ (d) $\{(3, 1)\}$

- (3) Twice its square the number $\frac{1}{2}$ is
- (a) $-\frac{1}{2}$ (b) $\frac{1}{2}$ (c) $\frac{1}{4}$ (d) 1
- (4) The domain of the function $f : f(x) = \frac{x-2}{7}$ is
- (a) \mathbb{R} (b) $\mathbb{R} - \{2\}$ (c) $\mathbb{R} - \{7\}$ (d) $\mathbb{R} - \{2, 7\}$
- (5) $x^2 + kx + 9$ is a perfect square if $k = \dots\dots\dots$
- (a) 3 (b) -3 (c) ± 3 (d) ± 6
- (6) If the probability of failure of a student is 0.4, then the probability of his success is
- (a) zero (b) 1 (c) $\frac{2}{5}$ (d) $\frac{3}{5}$

2 [a] Using the general formula, find in \mathbb{R} the solution set of the equation :

$$x^2 - 2x - 6 = 0$$

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x}{x-4} - \frac{x+4}{x^2-16}$$

3 [a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S. of the following two equations :

$$x - y = 2, \quad x^2 - 5y = 4$$

[b] If $n(x) = \frac{x^2 + 3x}{x^2 + x - 6}$

(1) **Find :** $n^{-1}(x)$ and find the domain of n^{-1} (2) If $n^{-1}(x) = 2$, find value of x

4 [a] Find in $\mathbb{R} \times \mathbb{R}$ the S.S of the following two equations graphically :

$$y = 2x - 3, \quad x + 2y = 4$$

[b] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x^3 - 8}{x^2 - 6x + 5} \div \frac{x^3 + 2x^2 + 4x}{2x^2 + x - 3}$$

5 [a] A bag contains 15 balls numbered from 1 to 15, if a ball is drawn randomly, if the event A is getting an odd number and the event B is getting a prime number

Find : (1) $P(A)$ (2) $P(B)$ (3) $P(A - B)$

[b] If $n_1(x) = \frac{2x}{2x+4}$, $n_2(x) = \frac{x^2 + 2x}{x^2 + 4x + 4}$

Prove that : $n_1 = n_2$

24 Matrouh Governorate



Answer the following questions : (Calculator is permitted)

1 Choose the correct answer from those given :

(1) $3^{-2} = \dots\dots\dots$

- (a) -9 (b) $\frac{-1}{9}$ (c) $\frac{1}{9}$ (d) 9

(2) If A and B are two mutually exclusive events in a random experiment , then $P(A \cap B) = \dots\dots\dots$

- (a) zero (b) \emptyset (c) 1 (d) $\{0, 1\}$

(3) The solution set of the inequality : $x \leq 1$ in \mathbb{N} is $\dots\dots\dots$

- (a) $\{1\}$ (b) $\{0\}$ (c) $\{0, 1\}$ (d) $\{0, 1, -1, \dots\}$

(4) The set of zeroes of f where $f(x) = \frac{x^2 - 9}{x - 2}$ is $\dots\dots\dots$

- (a) $\{2\}$ (b) $\mathbb{R} - \{2\}$ (c) $\{3, -3\}$ (d) $\{3, -3, 2\}$

(5) If $n(x) = \frac{x-7}{x+3}$, then the domain of n^{-1} is $\dots\dots\dots$

- (a) \mathbb{R} (b) $\mathbb{R} - \{-3\}$ (c) $\mathbb{R} - \{-3, 7\}$ (d) $\mathbb{R} - \{7\}$

(6) The point of intersection of the two straight lines : $y = 2$ and $x + y = 6$ is $\dots\dots\dots$

- (a) $(2, 6)$ (b) $(2, 4)$ (c) $(4, 2)$ (d) $(6, 2)$

2 [a] Find the common domain in which the two functions f_1 and f_2 are equal where :

$$f_1(x) = \frac{x^2 + 3x + 2}{x^2 - 4} \quad , \quad f_2(x) = \frac{x^2 - 1}{x^2 - 3x + 2}$$

[b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set to the following two equations graphically :

$$y = x + 4 \quad , \quad x + y = 4$$

3 [a] Find $f(x)$ in the simplest form , showing the domain of f where :

$$f(x) = \frac{x^2 - x}{x^2 - 1} + \frac{x + 5}{x^2 + 6x + 5}$$

[b] Find in \mathbb{R} the solution set of the equation : $x^2 - 2x - 6 = 0$
approximating the result to the nearest two decimals.

- 4** [a] Find $n(x)$ in the simplest form showing the domain of n where :

$$n(x) = \frac{x^2 - 3x + 2}{x^2 - 1} \div \frac{3x - 5}{x^2 - 4x - 5}$$

- [b] Find in $\mathbb{R} \times \mathbb{R}$ the solution set of the two equations :

$$y = x - 3, \quad x^2 + y^2 = 17$$

- 5** [a] If the set of zeros of the function f where :

$$f(x) = ax^2 + bx + 8 \text{ is } \{2, 4\} \text{ Find the value of } a \text{ and } b$$

- [b] If A and B are two events in a random experiment

$$, P(A) = 0.8, \quad P(B) = 0.7 \text{ and } P(A \cap B) = 0.6$$

Find : (1) The probability of non occurrence of the event A

(2) The probability of occurrence of at least one of the events.